may
1956

MACHINE AND TOOL blue book

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CONTENTS ON PAGES 5 AND 6

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Model 4B/M2/E2
Equipped with standard work track
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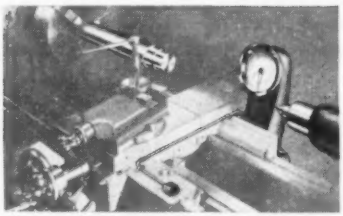
Illustrated with tail stock backed off.



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A long range indicating device for accurately determining tool position with relation to a predetermined reference. It indicates to the operator (within .0025") when the cutting tool has covered the required distance on the workpiece. Provides much-needed machine control for repeat operations, when roughing down to size, particularly where the tool travel is long. Can be readily located on any machine tool carriage regardless of table travel. It eliminates scrap, increases machine productivity and maintains dimensional quality.

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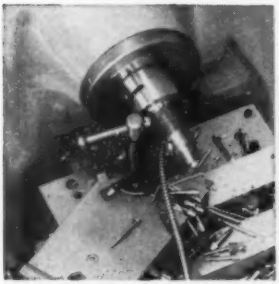
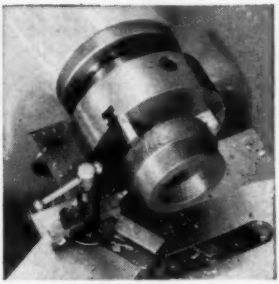


Precision Collet work for all sizes to 1-1/16" Collet seats *directly* in spindle.

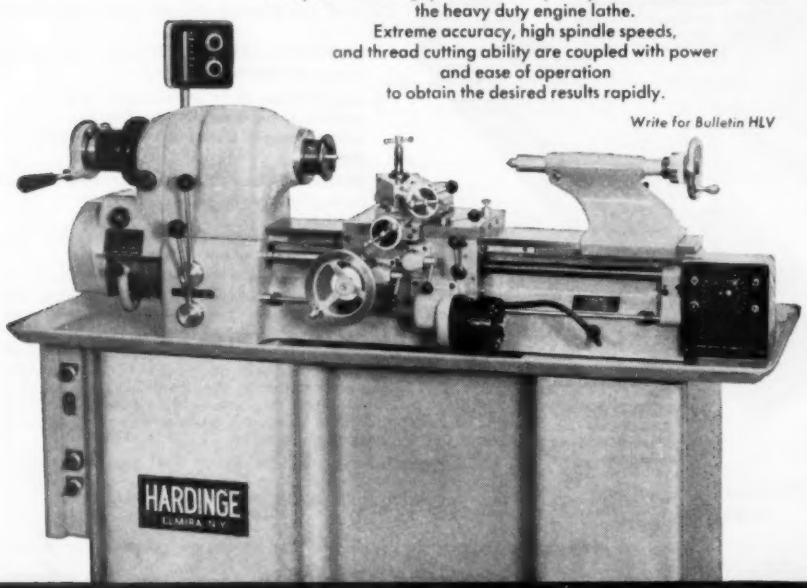
Precision Step Chucks for diameters up to 6". Provides Collet-like accuracy.



Integral Mount Jaw Chucks for precision holding of regular or irregular shapes up to 5".

Hardinge Model HLV 10" Lathe was primarily designed to fill a very old existent gap between the plain precision bench lathe and the heavy duty engine lathe.
Extreme accuracy, high spindle speeds, and thread cutting ability are coupled with power and ease of operation to obtain the desired results rapidly.

Write for Bulletin HLV



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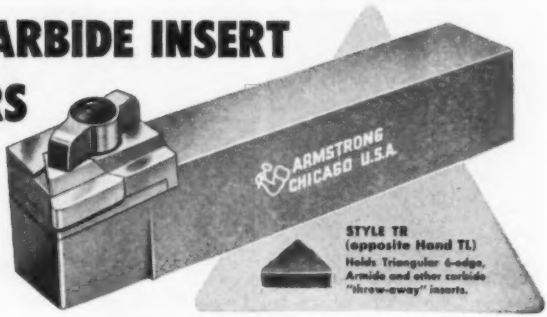
New ARMSTRONG

Armide CARBIDE INSERT TOOL HOLDERS



Embody...Convenience, Economy Simplicity and Strength based on these superior features:

- **IMPROVED CLAMPING METHOD — speeds indexing of Inserts.**
- **REPLACEABLE SEAT of Hardened Tool Steel — protects shank and provides flat base to prevent damage to inserts as they are clamped in position.**
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A slight turn of a single screw permits rapid indexing of the ARMIDE insert—reducing down time to a minimum.

The use of ARMIDE "throw away" inserts provides the economy of multiedged inserts—triangular inserts have six, square inserts eight cutting edges. These are available in Utility or Precision finish and in three grades of ARMIDE: 350, 370 or 883.

Protection to the shank is given by the replaceable tool steel seat which prevents wear and damage to the shank and provides a flat base for the insert reducing the possibility of damage to the insert as it is clamped in place. A relief groove is ground into the seat providing clearance when a dulled insert with "built up" edges is turned over.

ARMSTRONG ARMIDE Carbide Insert Tool Holders are furnished in two styles and three sizes. Complete data on these tools is given in Bulletin CIT, mailed on request.

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"The Tool Holder People"

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READER'S GUIDE

MACHINE AND TOOL
blue book

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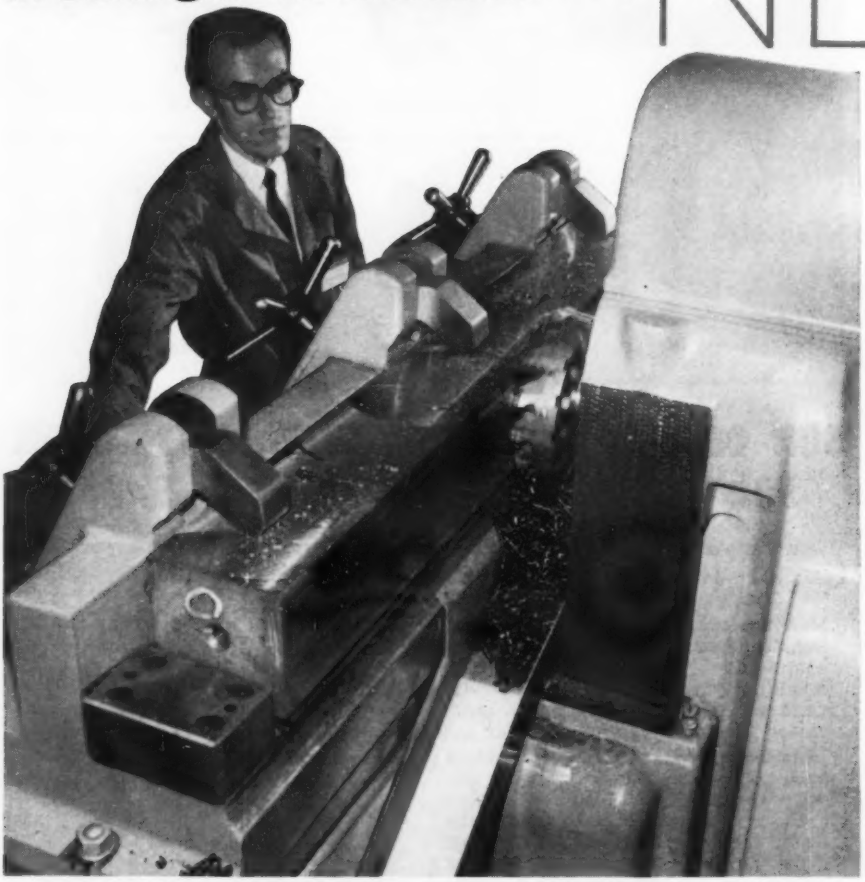

A high cubic removal job (¼" depth of cut, 19 ipm feed) . . . milling the sides of heavy machine tool part on a new CINCINNATI® No. 5 Plain Dual Power Dial Type Milling Machine.

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Styles	Plain Univ. Vert.	Plain Univ. Vert.	Plain *Univ. Vert.	Plain Vert.
Table travel	34"	42"	50"	60"
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(D.P.)	30 hp	50 hp	50 hp	50 hp

*No. 5 Universal available in High Power Machine only

Power draw-bar attachment reduces the cost of this 12-operation job on No. 4 Vertical Machine.

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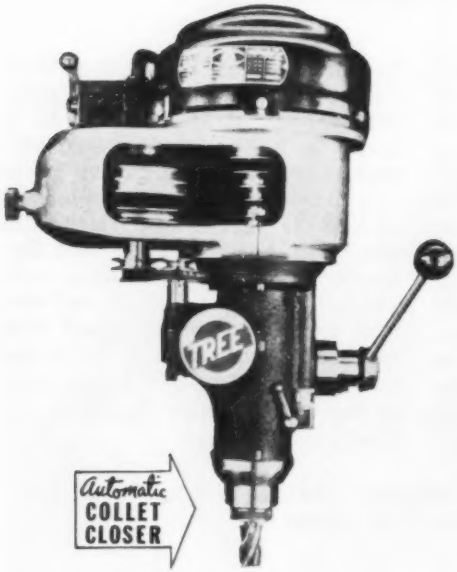

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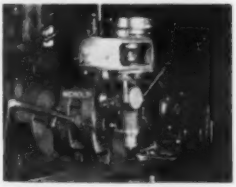

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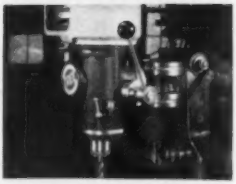
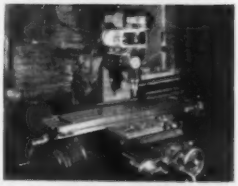
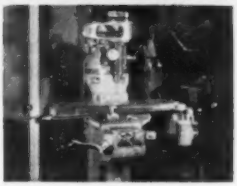


Milwaukee



Bridgeport



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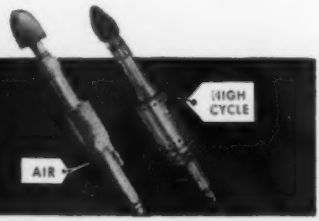

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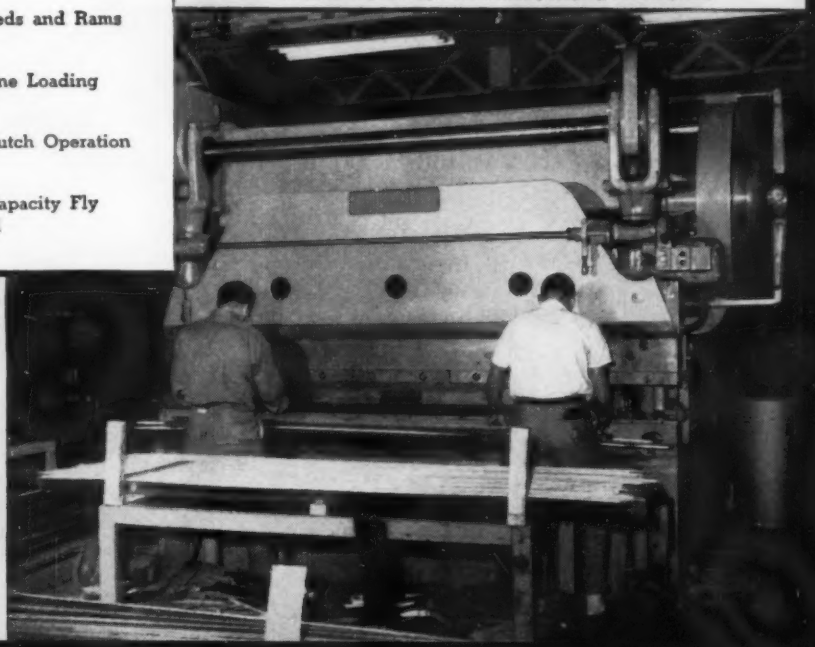

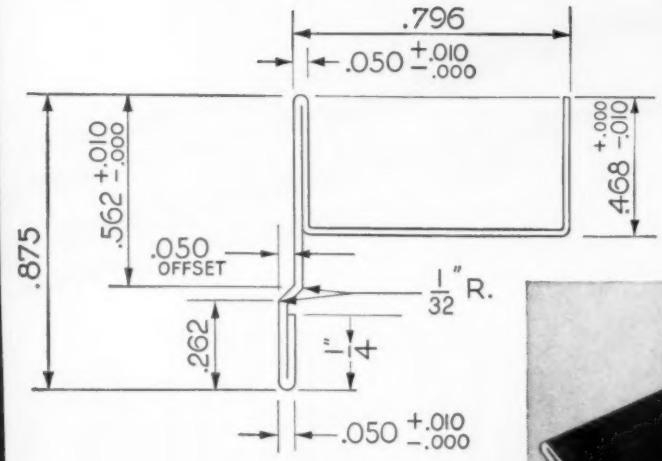

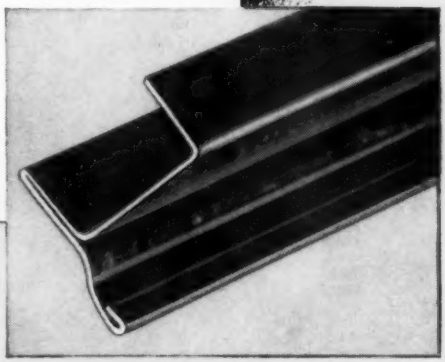

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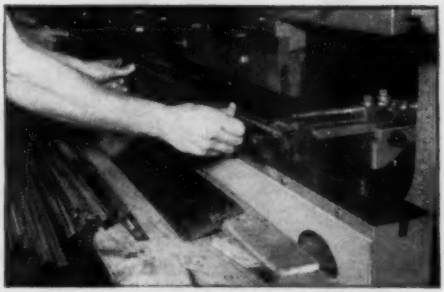

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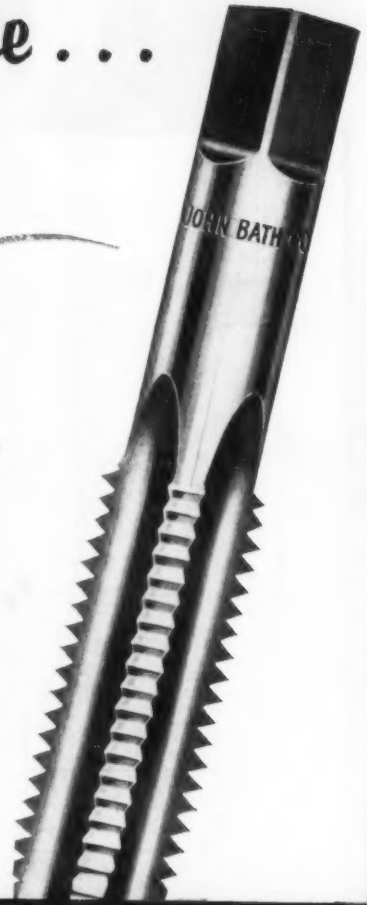

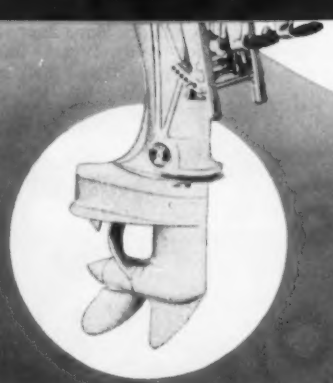

Threading aluminum lower unit gear case of a Mercury Mark 25 outboard motor with a ¾"-16 NF Bath Tap.

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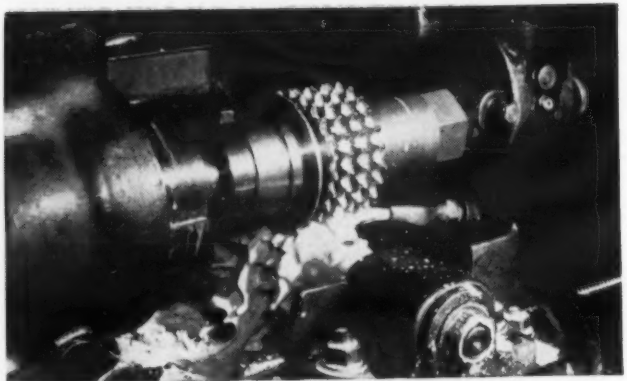

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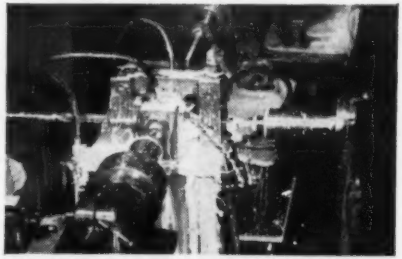

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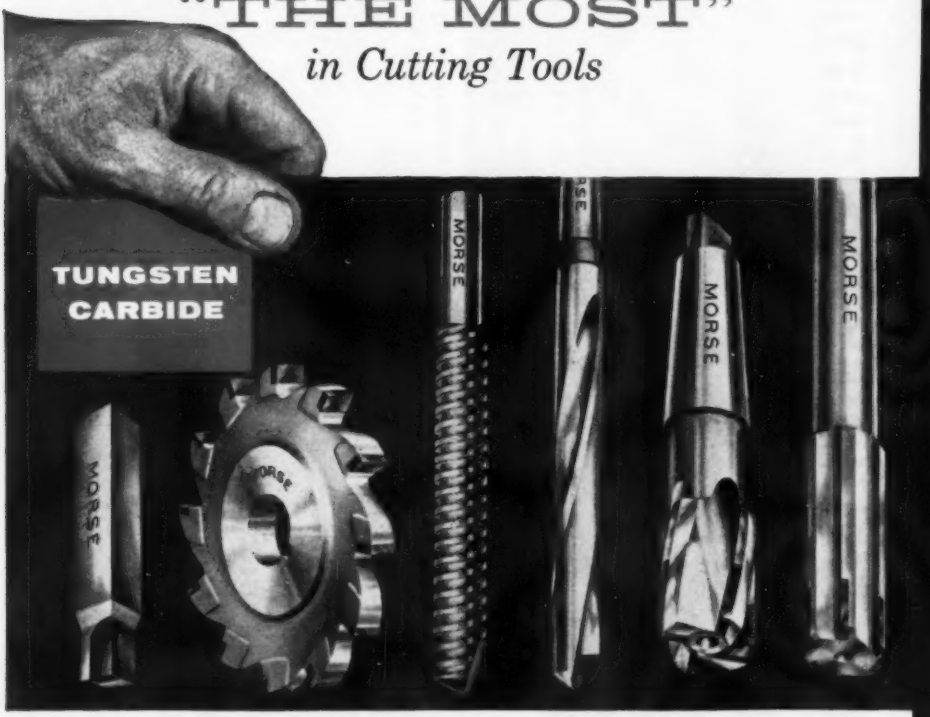
SUNOCO

Here's why . . .
more than ever . . .

MORSE

means

"THE MOST"
in Cutting Tools



. . . *plus* MORSE
Electrolized Tools

On jobs where there's excessive wear and abrasion, Morse Drills, Taps, Reamers, Cutters and End Mills last 2 to 10 times longer than untreated tools. Available only from your Morse-Franchised Distributor.

. . . *plus* MORSE
"Vectormatic-Ground" Taps

New, exclusive Morse "Vectormatic" process gives you taps with "locked-in precision" . . . with tolerances held nearly 300% closer than with old thread-grinding methods. Available only from your Morse-Franchised Distributor.

Now Morse gives you everything from carbon to carbide . . . the most complete cutting tool line in industry today. *And the one man who has this complete line is your Morse-Franchised Distributor.*

This means that all your needs can be covered by one order . . . one invoice . . . backed up by Morse engineering service. And it also means that your Morse-Franchised Distributor can freely recommend the best cutting tool for every job in your plant . . . *regardless of tool requirement.* So see him *now* for all the cutting tools you need, including the new Morse Tungsten Carbide line, tipped or solid.

MORSE TWIST DRILL & MACHINE COMPANY · NEW BEDFORD, MASSACHUSETTS

(Division of VAN NORMAN CO.) Warehouses in New York, Chicago, Detroit, Dallas, San Francisco

MORSE

CUTTING TOOLS

Buy them by phone from your Morse-Franchised Distributor and save ordering time

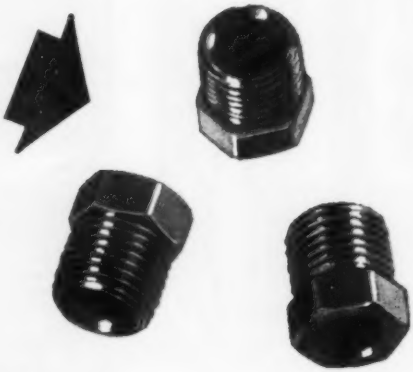
Circle No. 214 on Card, Opposite Page 65

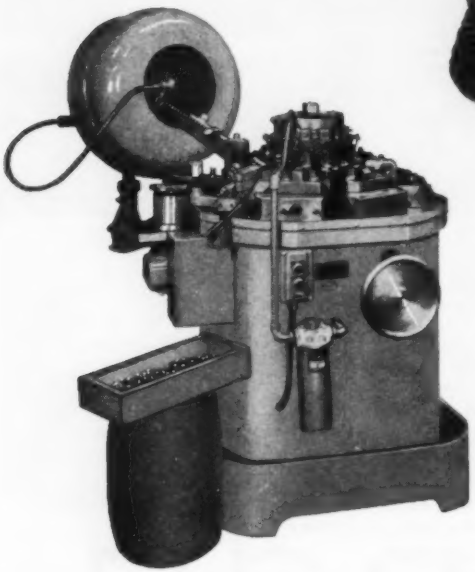
Prutton THREAD ROLLING MACHINERY

9,000 Tubing Nuts Per Hour !

RUNNING 3 SIZES!

1/2" —20 Thread — 5/16" Hole
7/16"—24 Thread — 1/4" Hole
3/8" —24 Thread — 3/16" Hole





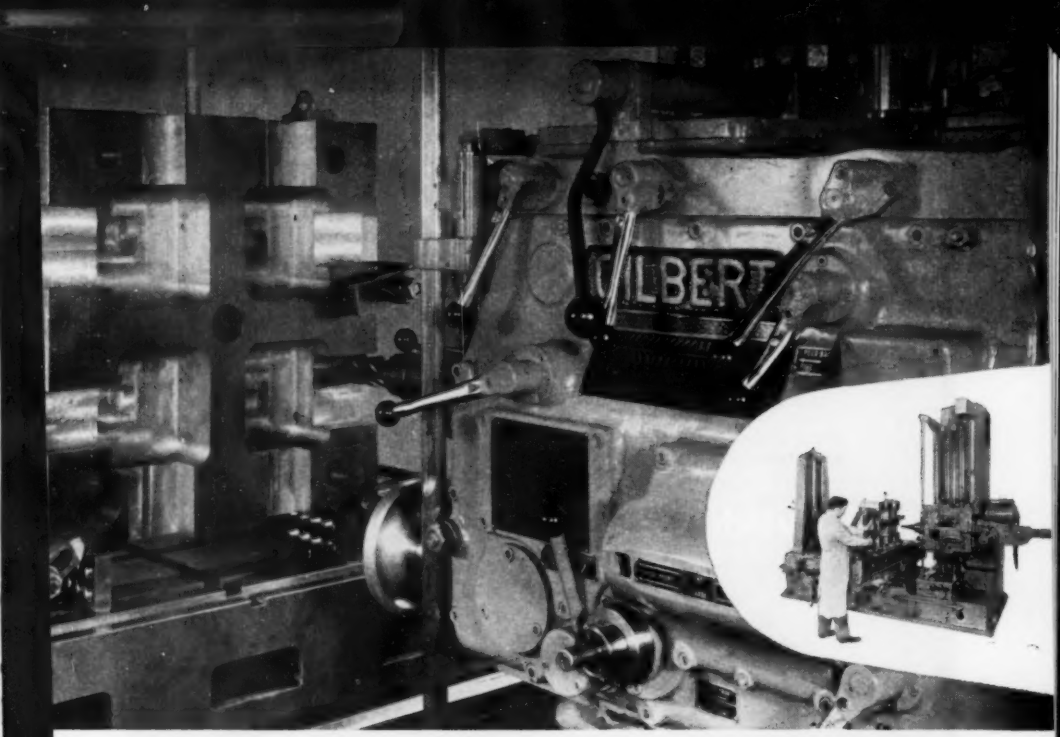
This high speed production operation employed the Exclusive Prutton MANDREL SYSTEM TO SUPPORT THE INSIDE DIAMETER. Similar results can be achieved on your threading with Prutton Thread Rolling Machinery.

Submit your parts for our recommendations. No obligation.

Prutton Corporation

5296 WEST 130th ST. CLEVELAND 30, OHIO

Circle No. 215 on Card, Opposite Page 65



courtesy Mohawk Tool & Die Corporation and Macaulay Machinery Co.

30 percent savings and ±.001"

. . . match it with a Gilbert

How's this for a perfect lineup: 30% savings in floor-to-floor time over previous machines, and ±.001" for mating the two chases of a four-cavity carburetor bowl mold.

Mohawk Tool & Die Corp., Rochester, N.Y., gets these savings and accuracy by handling the job on a Cincinnati Gilbert horizontal boring mill.

Here the lower chase (of hot work die steel) is being rough machined. Then it's hardened to a Rockwell of 48-50C scale. Finally, the chase is finish machined with carbide to an accuracy of ±.001" for guide pin and bushing holes, four cavity pockets, and eight slide ways.

Says Mr. George Neward, Mohawk's Secretary-Treasurer: "This job illustrates the flexibility of this type of machine. The ruggedness and stability of the Cincinnati Gilbert has been proven to us without doubt."

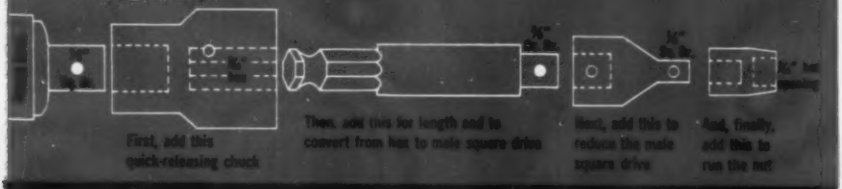
The comparatively low cost of adding these advantages to your operations will surprise you. Write for new literature, or—better yet—get a proposal from Gilbert now.

The Cincinnati Gilbert Machine Tool Co., 3366 Beekman Street, Cincinnati 23, Ohio

those who buy Gilbert buy **GILBERT** *again*

are you running nuts and cap screws the hard way?

like this?


First, add this quick-releasing chuck
Then, add this for length and to convert from hex to male square drive
Next, add this to reduce the male square drive
And, finally, add this to run the nut

then switch to APEX . . . *the easy way!*

like this!

The easiest, most efficient and least expensive way to run nuts on production or maintenance work is with Apex nut running tools, designed and built to meet your requirements.

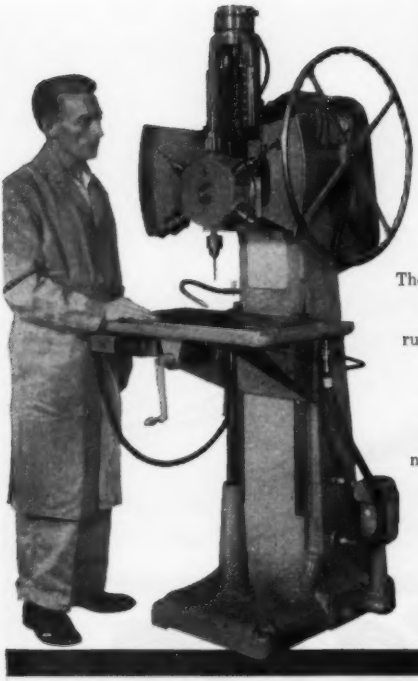
When you need extra length, for example, Apex stocks a full line of extensions to fit your tool anvils and accessories, regardless of the combination of types and sizes. Apex extensions bring power closer to the work, eliminate unnecessary tooling and extra connections that cause backlash and loss of power. Available in short and standard lengths, and in long lengths in increments of one inch. ¾", 1", 1½" and 2½" square drive extensions are offered with ball lock or cross pin hole; other sizes and types are available with ball lock or pin lock.

Extensions are just one part of the complete Apex line of nut running tools, all of which are fully described in Catalog 29-R. Write, on your company letterhead please, for your copy.

Ask **APEX** *for the answer to your fastening problem!*

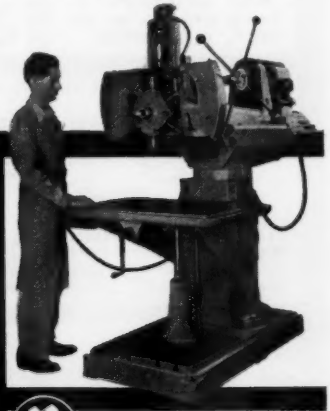
THE APEX MACHINE & TOOL COMPANY
1028 S. Patterson Blvd. • Dayton 2, Ohio

Circle No. 217 on Card, Opposite Page 65



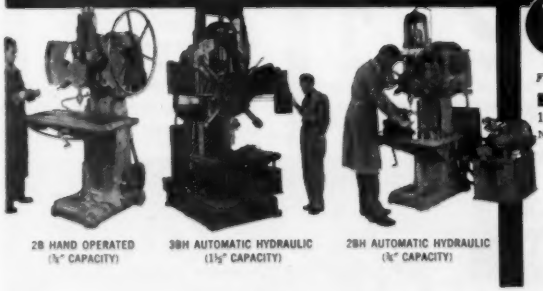
NEW
a sensitive, fast
BURGMASTER®
TURRET DRILL—Model 1C

The Model 1C Turret Drill expands the BURGMASTER line to include a smaller capacity, sensitive feed, fast operating machine. It is built to the same rugged standard for rigidity and accuracy evident in the larger BURGMASTER units. Users will experience such important benefits as fast power indexing; very sensitive hand feed; preselective speeds and stops; time savings and increased accuracy by elimination of quick change tools, or need for moving from one machine to another; easy handling of holes up to ⅜" in steel, thus freeing heavy duty machines for larger capacity work.



The *IMPROVED* Model 2BR
RAM TYPE RADIAL TURRET DRILL...

features a new sensitivity in handling, power indexing and power clamping. When the ram is clamped in position, the 2BR can function as a deep throat production turret drill, easily handling holes up to ¾". This machine greatly increases production on bulky pieces as all tools are mounted on the machine and are quickly indexed into position. The operator simply brings the spindle into position over the work, releases pressure on a button in the handle (located on turret head) and the machine automatically clamps ram and column. He is ready quickly to drill, tap, etc., thereby saving repositioning several times over a particular position.



2B HAND OPERATED (¾" CAPACITY)

3BH AUTOMATIC HYDRAULIC (1½" CAPACITY)

2BH AUTOMATIC HYDRAULIC (¾" CAPACITY)

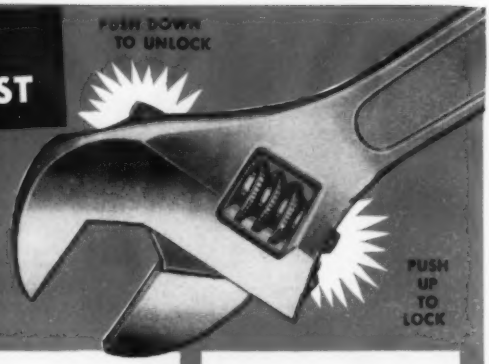
For complete information, write **Dept. MT-5**

BURG TOOL *Manufacturing Co., Inc.*
15001 S. Figueroa St., Gardena, Calif.
NEW YORK • CHICAGO • SAN FRANCISCO

THE MACHINES THAT USE THEIR HEADS

Circle No. 218 on Card, Opposite Page 65

EXTRA VALUE AT NO EXTRA COST



THE EXCLUSIVE PATENTED LOCKING FEATURE . . . of Williams new "push-button" adjustable wrench is typical of the extra value you get in Williams tools . . . and, they are so easy to get through your local distributor.

ALLOY "SUPERRENCHES"®
Over 30 patterns in 386 sizes from 3/16" to 3 1/16" openings.

CARBON WRENCHES
Over 30 patterns in 581 sizes with openings from 3/16" to 7 3/4".

"SUPERSOCKETS"®
1/4, 3/8, 1/2, 3/4, 1" Square Drives. Openings from 3/16" to 3 1/16".

POWER IMPACT SOCKETS
For all power and impact wrenches. Seven square drives 1/4" to 1 1/2". Hex and square openings 3/16" to 3 1/2".

TOOL HOLDERS AND SET-UP ACCESSORIES
A complete range of tool holders, lathe dogs, cutters, T-slot bolts and nuts, wedges, washers and strap clamps.

DROP-FORGED C CLAMPS
General and heavy service, Deep throat standard and spatter-resisting, Tool makers', and Machinists'.

HOIST HOOKS AND EYE BOLTS
Proof-tested Hoist Hooks, shank and eye patterns, 1/2 to 30 Ton capacities. Eye Bolts, plain and shoulder patterns, blank or threaded.

PIPE TONGS AND VISES
Tongs — 4 styles — 1/4 to 18" pipe capacities.
Vises — 2 styles — 1/8 to 8" pipe capacities.

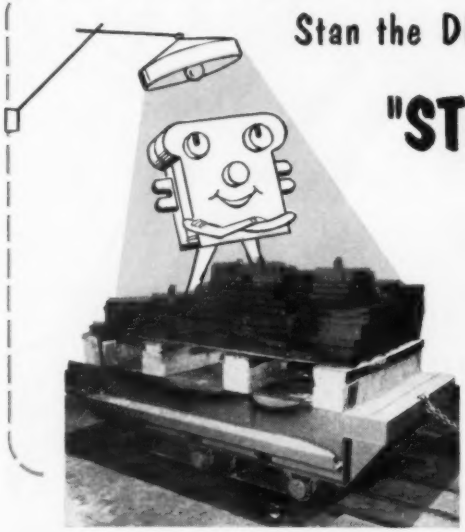
PLUS Thumb nuts and screws, machine handles, rod ends, flange jacks, screw drivers, pliers, soft-face and ball pein hammers, punches, chisels, pullers, feeler gauges, body and fender tools, masonry bits, screw extractors, auger bits.

WILLIAMS
INDUSTRIAL TOOLS

"THE BROADEST LINE OF ITS KIND"
Write for Catalog 302
J. H. WILLIAMS & CO.
409 Vulcan Street, Buffalo 7, New York

Circle No. 219 on Card, Opposite page 65

Stan the Die Set Man says . . .



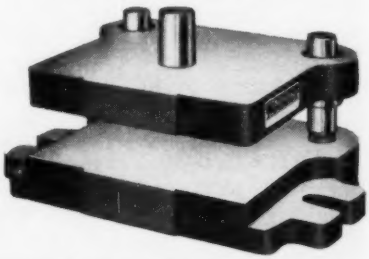
"STRESS RELIEF ENDS TOOLING GRIEF"

Want a die set where the dimensions "stay put"? If you do, then you want die sets built by Standard.

After completion of rough machining, all Standard catalog back post steel die sets are slowly heated to 1550°F., thoroughly soaked at that temperature for 3 hours, then slowly cooled back to room temperature, thereby removing all residual stresses.

RESULT: Then and only then can you have the assurance that the precision tolerances of the matching bored holes, the parallelism of the working surfaces, and the precise workmanship of the tool and die maker — are not lost through instability of the steel itself.

STANDARD DIE SET MANUFACTURERS, INC.
Providence 7, Rhode Island



THERE'S A DIFFERENCE IN DIE SETS AND STANDARD MAKES THE DIFFERENCE!

MAIL THIS COUPON NOW

STANDARD DIE SET MFRS., INC.
1489 ELMWOOD AVENUE
PROVIDENCE 7, R. I.

Please send me your
☐ Comparison Chart ☐ Die Set Catalog

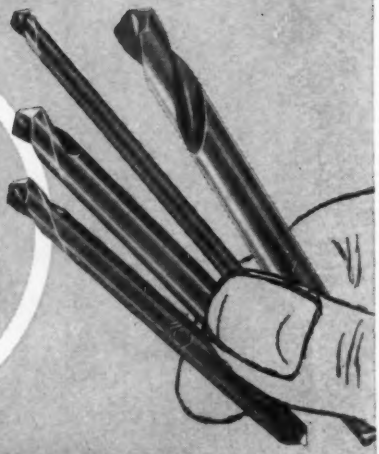
Name.....
Company.....
Address.....

CALL STANDARD FOR PROMPT DIE SET SERVICE!
New York • Philadelphia • Buffalo • Grand Rapids • Detroit • Indianapolis • Louisville

Circle No. 220 on Card, Opposite Page 65

The Drill Sarge Says...

"New York Body Drills are really rugged!"



TOUGH LITTLE DRILLS THAT PACK A BIG WALLOP ON AUTOMOBILE ASSEMBLY LINES

New York's body drills are specially designed for accelerated assembly lines. You'll find them in the country's largest auto plants because they bite fast, make clean quick holes and are extra tough for long and continuous service.

These heavy duty drills feature extra sturdy shanks, short flutes – with or without radial relief – and split points that help minimize operator fatigue. Then there's New York's special nitriding and homo-treating to add to their toughness. As with our standard drills, New York's body drills give you a saving of 20%.

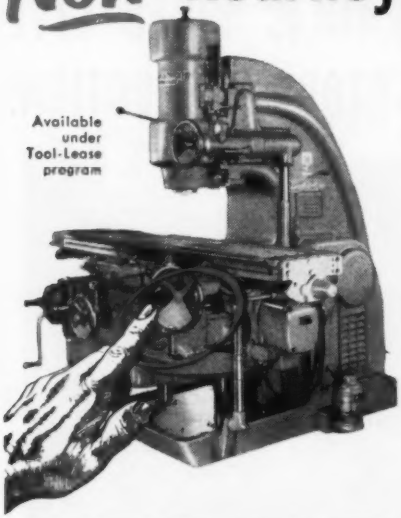
All New York drills are made to last longer and give greater production. Holes are perfectly round, exactly on size without burrs, and you get more holes per drill. Perfect reasons for using New York drills on *your* assembly line–or wherever there's a difficult operation.

Write us now for complete catalog, technical manual and net prices

NEW YORK TWIST DRILL COMPANY, INC.

EASTERN HEADQUARTERS: 278 LAFAYETTE STREET, NEW YORK 12, N. Y.
MIDWESTERN HEADQUARTERS: 30-A NORTH CLINTON STREET, CHICAGO 6, Ill.

Now Kearney & Trecker has Front-Mounted *(convenience-engineered)* Handwheel



Available under Tool-Lease program

Standard equipment on new TF Series milling machines... permits faster table setting... eliminates costly errors

THE front-mounted table handwheel is a standard feature on all Kearney & Trecker new TF Series, knee-type milling machines—Plain, Universal and Vertical. Mounted on the right front of the saddle and projecting diagonally, the newly positioned handwheel is a part of Kearney & Trecker's up-front central control grouping.

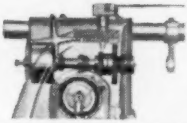
Because table handwheel is ideally located so as to simplify operation of the machine, the operator makes table settings more accurately — in less time and without leaving his normal operating position.

In addition, the new TF's give you a combination of more outstanding design and operating features (illustrated at left) than any other knee-type milling machines. They're built in five sizes — No. 2 to No. 6 from 10hp to 50hp.

For more information, see your nearest Kearney & Trecker representative, or write direct to Kearney & Trecker Corp., 6796 W. National Ave., Milwaukee 14, Wisconsin.

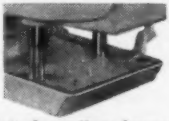
5 more reasons why TF Series milling machines are so easy to operate

Heavier, Wider Knee — *Twin Screws* support the one-piece, larger knee. Span and length of ways is increased considerably, providing greater saddle support . . . lasting accuracy . . . substantial reduction of way and gib wear.



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life, quieter operation.

"Vibra-Void" Overarm — Two solid steel bars, mounted through column, void vibration at source, afford more rigidity and resistance to deflection than any other support. Design simplifies changing arbors and cutters.



Twin Screw Knee Support — Exclusive double-support arrangement most effectively distributes weight of machine's heavier knee, saddle and table. Design assures stability and greater accuracy under all cuts.

KEARNEY & TRECKER MILWAUKEE ®

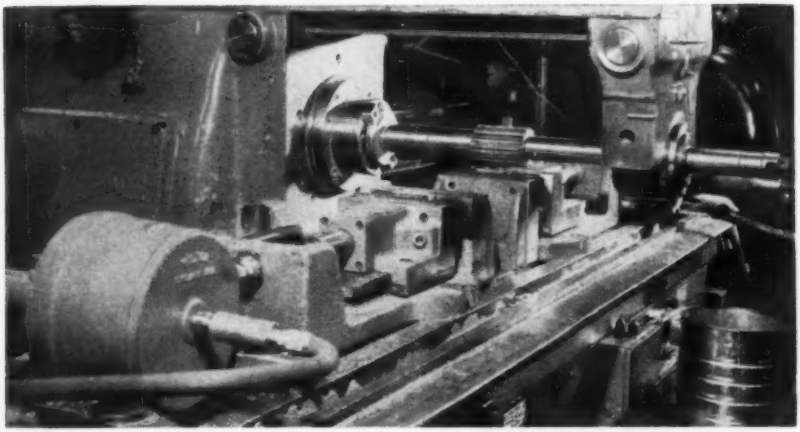
DESIGNERS AND BUILDERS OF PRECISION AND PRODUCTION MACHINE TOOLS SINCE 1898

Massive Column — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces. Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine inspection.

Circle No. 222 on Card, Opposite Page 65

a new tooling concept from Wilton!

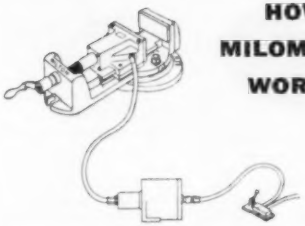
MILOMATIC AIR-HYDRAULIC VISES GIVE THE MARTIN CO. "NON-STOP" PRODUCTION!



With MilOmatic air-hydraulic vises, the Martin Company was able to equip this milling machine for automatic loading and continuous operation in the time required to tighten six bolts! The cost was far less than custom tooling, and both vises can be moved to other jobs in minutes. MilOmatics can be equipped with inexpensive jaw inserts to hold work pieces of any shape—ideal for the quick changes in tooling demanded for today's production. Use them in your plant to boost productivity and gain new tooling versatility!

MILOMATIC FEATURES!

- instantaneous automatic action
- self cleaning flat bed design
- vibration-free locking lengthens cutter life
- low and compact—nothing extends above the jaws



HOW MILOMATIC WORKS

Touch of air control activates hydraulics booster which instantly applies 9000 lbs. of locking force to jaws. Power stroke is 7/16". MilOmatics come complete with air-hydraulic system and controls.

Attach this Ad to your letterhead for free demonstration or literature!

WILTON TOOL MFG. CO., INC.

MT3 SCHILLER PARK, ILLINOIS

Circle No. 223 on Card, Opposite Page 65

Turbo Jet Blades

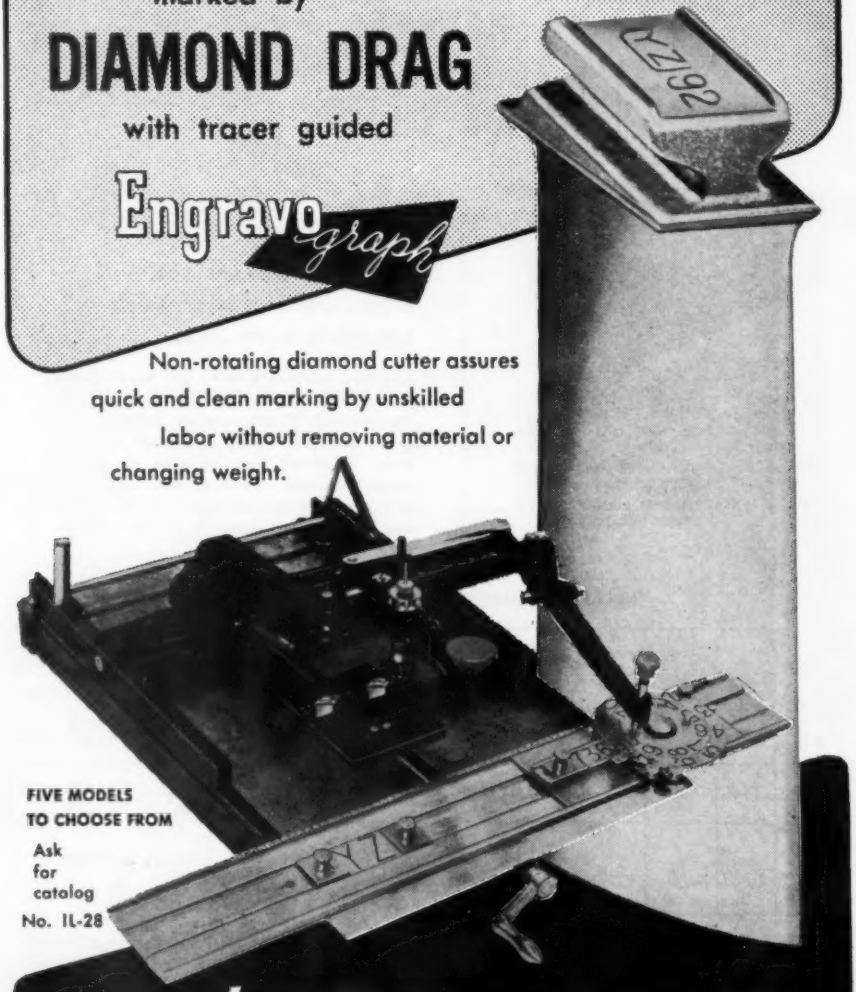
marked by -

DIAMOND DRAG

with tracer guided

Engravograph

Non-rotating diamond cutter assures quick and clean marking by unskilled labor without removing material or changing weight.



FIVE MODELS TO CHOOSE FROM

Ask for catalog No. IL-28

new hermes ENGRAVING MACHINE CORP.

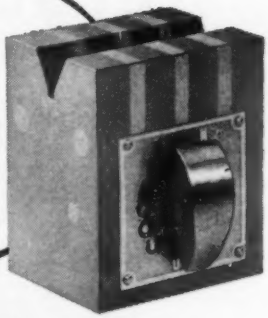
13-19 University Place, New York 3, N.Y.

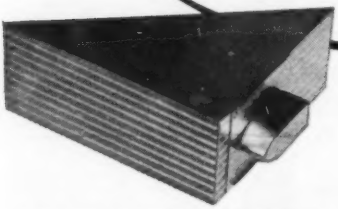
Circle No. 224 on Card, Opposite Page 65

They've got the Tenacity of a BULLDOG!

HOLLAND

PERMANENT MAGNETIC JUNIOR CHUCKS





- Use 'em as bench tools for holding small, medium or large pieces for hand finishing, such as polishing, scraping, filing, etc.
- Use 'em for wet or dry grinding rows of small to large parts.
- Use 'em on surface plates . . . For testing and inspection purposes.

Eliminate clamps and vises... Won't mar work or interfere with tools

Readily portable with all steel body, ground top and bottom, flat and parallel, these chuck blocks contain multiple pole brass spacers. They can't heat to cause work distortion because they require no electric current. *Work is laid end-to-end over the pole spacers and held in a "bull-dog" grip when knob is in ON position. Turn OFF for release.*

HOLLAND PERMANENT MAGNETIC JUNIOR CHUCKS

No.	Depth of Vee	Lines of Force	Dimensions Height — Length Width	Price Per Pair	Price Singly	No.	Lines of Force	Dimensions Height–Base Leg –Width	Price Per Pair	Price Singly
A-1			2-1/16" x 1-7/8" x 1-1/2"	$42.00	$22.50	D-2 45°		3" x 3" x 1-5/8"	$55.00	$30.00
A-2	7/16"		2-1/4" x 1-7/8" x 1-1/2"	45.00	25.00	D-3 60°		2" x 4-7/8" x 1-5/8"	55.00	30.00
A-5	1/4"		2-1/16" x 1-7/8" x 1-1/2"	45.00	25.00	B-1 Magnetic Pull top & bottom		1-7/8" x 2" x 2"	45.00	25.00
D-1 30°			Height – Base Leg –Width 4-1/4" x 2-3/8" x 1-3/4"	55.00	30.00					

Two different blocks may be ordered at the PAIR Price.

Send your order now! Immediate delivery! Write for our latest bulletins on specially priced all new tools including permanent magnetic chucks!

DeWitt

DE WITT EQUIPMENT CORPORATION
190 ELIZABETH AVE., NEWARK 8, N. J.

Circle No. 225 on Card, Opposite Page 65

WHEN SHARPENING DRILLS

PRECISION

IS ALL-IMPORTANT...

THE *Oliver*

DRILL POINTER

With the Oliver 510 Drill Pointer, all of the movements in sharpening a drill are automatic, and accomplished by fixed mechanisms to eliminate all chance of error. The Oliver 510 holds all drills from ¼" to 3" diameter and provides varying angles from 82 to 160 degrees. Available for either wet or dry grinding.

Oliver achieves the theoretically perfect point.

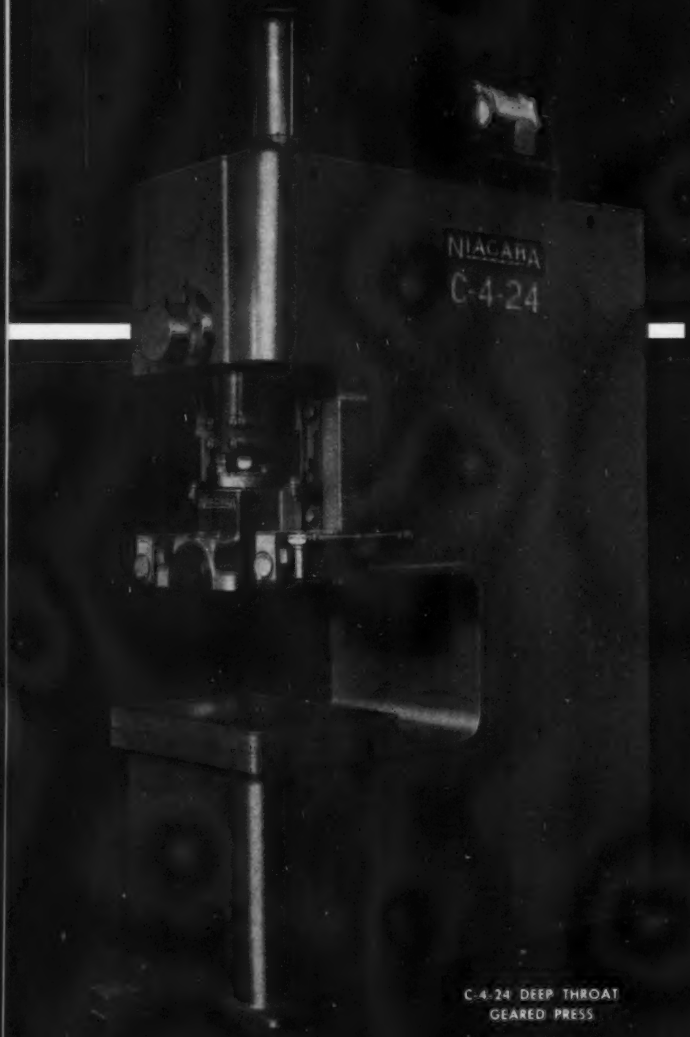
SEND A FEW DRILLS FOR FREE RESHARPENING . . . THEN BUY!

Oliver INSTRUMENT • COMPANY

1408 EAST MAUMEE OLIVER OF ADRIAN ADRIAN, MICHIGAN

FACE MILL GRINDERS • AUTOMATIC DRILL GRINDERS • DIE MAKING MACHINES
TOOL & CUTTER GRINDERS • DRILL POINT THINNERS • TEMPLATE TOOL GRINDERS

Circle No. 226 on Card, Opposite Page 65



C-4-24 DEEP THROAT
GEARED PRESS

Air counterbalance offsets weight of slide, die and connections.

No overhanging motor, belts, flywheel, brake, shafts nor other mechanisms.

Front-to-back crankshaft (heavy, forged, high carbon steel) enables fully stylelined, enclosed construction.

Multiple V-Gibs assure maximum die life.

Unusually long slide and stiff channel section eliminate deflection of guiding ways, increasing die life. (J.I.C. flanged slides available.)

Large range of throat depths accommodates tremendous variety of work.

Rugged, all-steel, box type frames stress relieved in a furnace and grit blasted before machining.

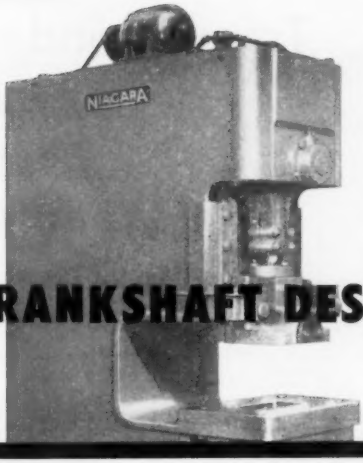
Foot switch optionally available for clutch control.

Readily equipped with pneumatic die-cushions for drawing operations.

Exclusive electro-pneumatic clutch on all geared models. Famous mechanical sleeve clutch on all plain non-geared models.

STYLELINE DEEP THROAT PRESSES

NEW



FRONT-TO-BACK CRANKSHAFT DESIGN

embraces numerous operating and structural improvements

Of far reaching importance, the development of Niagara's impressive, new Styleline Deep Throat Presses has opened the way to numerous operating and structural advantages. Barriers imposed by conventional side-to-side crankshaft arrangements and outmoded end wheel designs have been shattered. The Niagara-developed front-to-back crankshaft design introduces a new concept of deep throat press performance and economics:

MODERN, SPACE-SAVING, ENCLOSED CONSTRUCTION

The entire driving mechanism is within the limits of a compact, all-steel frame. There are no exposed, overhanging parts and mechanisms to obstruct crane service, block light, throw grease and consume floor space unnecessarily.

LONGER DIE LIFE, GREATER ACCURACY

Increased distance between gibs makes possible a wider slide (left to right) for greater support to wide dies. Longer gibs assure accuracy for the full stroke.

MINIMIZED SHAFT DEFLECTION AND GEAR WEAR

With all gears located inside the press frame and overhung bearings eliminated, damaging shaft deflection is held to a new minimum. Both pinion and gear are more rigidly supported to withstand maximum loading with minimum wear.

PROLONGED GEAR AND CLUTCH LIFE

Gears and clutch members, all neatly housed in the crown, operate in sealed baths of oil to assure longer service life.

Built in a large range of sizes and throat depths, these modern, Styleline Series C Presses reflect the latest thinking of Niagara engineers . . . today as always, pace-setters in power press advancement.

HERE'S THE WHOLE STORY ON WHAT THESE MACHINES CAN DO FOR YOU

Get all of the facts. Check the specs! Write for new, illustrated Bulletin 61 today. It will be mailed promptly without obligation.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.
DISTRICT OFFICES:
Buffalo • Cleveland • Detroit • New York • Philadelphia
Dealers in principal U. S. cities and major foreign countries

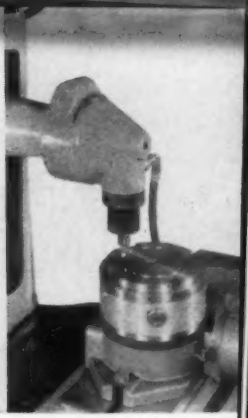
NIAGARA

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

Circle No. 227 on Card, Opposite Page 65

Tough grinding jobs?

Check *Vulcanaire* high speed precision grinding heads!



Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

Vertical adaptor for Surface Grinders. Grinding small slots

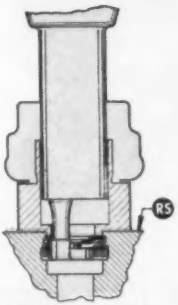
Horizontal application Grinding a Shoulder Punch.

Major Vulcan Services

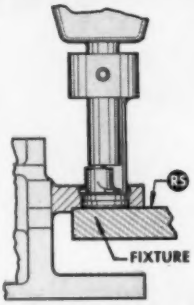
Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

VULCAN TOOL CO. 710 Highland Avenue DAYTON 10, OHIO

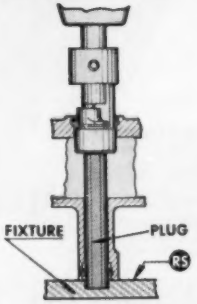
Even Unskilled Labor Can Use This Versatile Tool Accurately! It Simplifies Internal Grooving Problems, Cuts Production Costs!



A) Cuts two grooves of different depths and widths in one single operation from same reference surface.



B) Cuts groove in bore located in protruding member of workpiece. Reference surface on under side of protrusion.



C) Cuts grooves in two bores of different diameters from same reference surface. Tool banks on reference surface. Then workpiece is reversed and tool banks on plug.

Amazingly versatile! Your toughest recess cutting problems can be met simply and efficiently with the Waldes Truarc Grooving Tool because it offers a whole range of possibilities beyond the range of ordinary recessing tools.

Wide Cutting Range! The Waldes Truarc Grooving Tool comes in 5 models...enabling you to cut accurate grooves in housings with diameters from .250 to 5.00 inches.

Send Your Problems to Waldes! Send us your blueprints...let Waldes Truarc Engineers give you a complete analysis, price quotation and delivery information on the most economical tool set-up for your particular job. There is no obligation!

Write NOW for a 20-page manual containing full information on Waldes Truarc Grooving Tool

WALDES TRUARC® GROOVING TOOL

Made by the Manufacturers of Waldes Truarc Retaining Rings
WALDES KOHINOOR, INC., 47-16 Austel Place, L. I. C. 1, N. Y.
Waldes Truarc Grooving Tool Manufactured Under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Pl., L.I.C. 1, N. Y.

Please send me your new 20-page technical manual on the Waldes Truarc Grooving Tool. MT058

Name_____

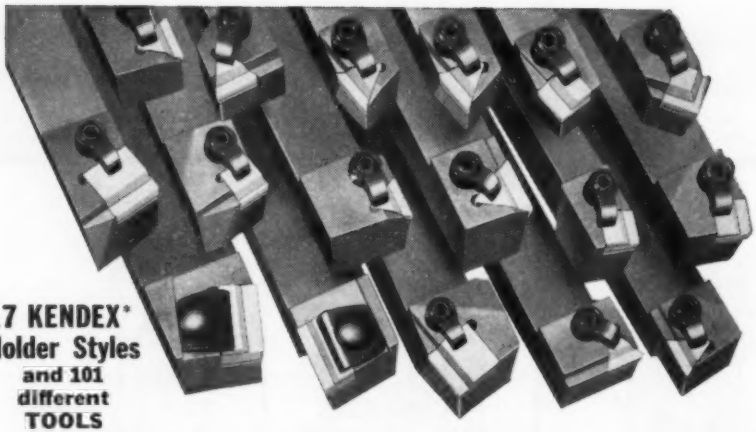
Title_____

Company_____

Address_____

City_____ Zone____ State_____

Circle No. 229 on Card, Opposite Page 65



17 KENDEX* Holder Styles and 101 different TOOLS

KENNAMETAL† today offers the tooling for tomorrow

Kendex Button and Heavy Duty tools can truly be considered as the "Tooling for Tomorrow."

Kendex holders are simple and rugged in construction; fitted with trouble-free, interchangeable "hardware"; accommodate square, round and triangular turnover, throw-away button inserts that eliminate costly grinding . . . all features needed to keep tomorrow's high speed, highly synchronized production lines on the go—hour after hour.

"Tooling for Tomorrow" must face up to varied cutting jobs, on many types of machines . . . machines that will require quick, accurate tool changing for close tolerance work at high speeds and low costs per piece. Kendex tooling was designed for such conditions. In addition, it increases efficiency; lowers tool investments; sharply reduces maintenance costs. There are over 100 Kendex tools and 35 different Kendex inserts—some stocked in as many as six Kennametal grades.

Why not have a Kennametal tool engineer help you step up efficiency on today's jobs with Kendex "tooling for tomorrow." He works exclusively with Kennametal tooling . . . applying and servicing it. This specialized experience is yours for the asking. KENNAMETAL INC., Latrobe, Pennsylvania.

Eleven Kennametal Grades . . . To Give You Top Performance

No matter how versatile or rugged the toolholder—final performance depends on the cutting edge. Here's where hard, uniform, dependable Kennametal blanks and inserts will pay off on your operations —regardless of the job or machine. With eleven grades to select from, you get top performance on every cutting job.

Try Grade K21, the ideal general purpose steel cutting grade that is outperforming all other general purpose carbides, and its companion . . . Grade K5H . . . a hard crater-resistant grade for finish machining at high speeds. Kennametal's simplified grade selection system makes it easy to get the right grade on every job.

INDUSTRY AND **KENNAMETAL** . . . Partners in Progress

*Registered Trademark; Patent applied for
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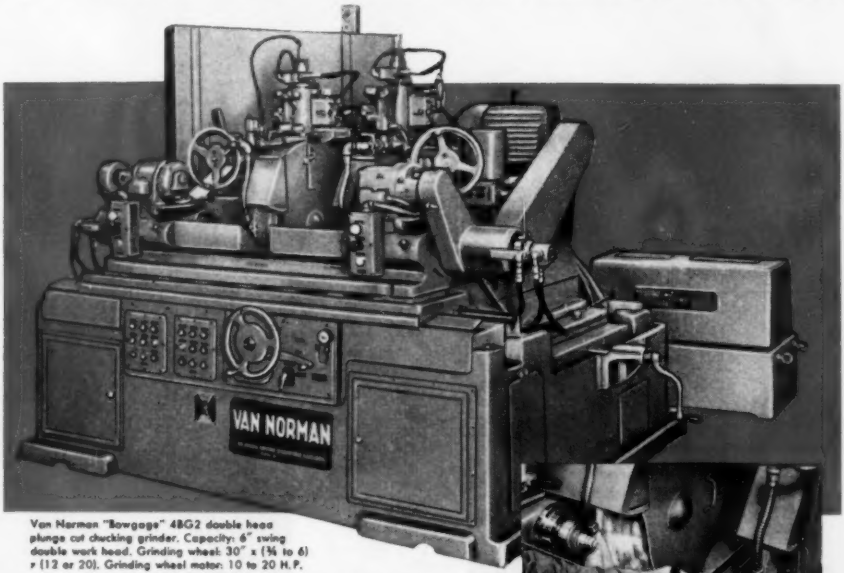
A-9435A

VAN NORMAN

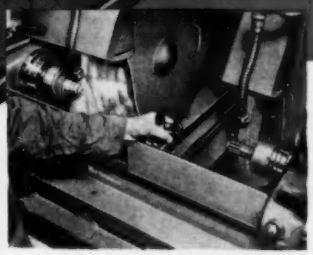
"Engineered for the Job"

"Bowgage" Production Grinders

Out Perform Them All for Speed, Accuracy and Low Cost Grinding



Van Norman "Bowgage" 4BG2 double head plunge cut chucking grinder. Capacity: 6" swing double work head. Grinding wheel: 30" x (¾ to 6) r (12 or 20). Grinding wheel motor: 10 to 20 H.P.



Grinding Universal joint flange on the Van Norman "Bowgage" 4BG2 .022 stock removal — 1.625 diam. — 15 R.M.S. — Maximum 480 pieces per hour.

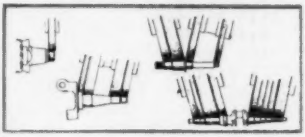
You just can't beat Van Norman "Bowgage" Production Grinders for fast, economical mass production. These massive, rugged grinders are "*engineered for the job*" to meet your exacting requirements.

Illustrated is the Van Norman "Bowgage" 4BG2 double head plunge cut grinder designed and built for a major automotive manufacturer. Day after day, this 14.8 ton rugged brute and other single and double head grinders are showing substantial savings by keeping production up and costs down.

If you have a mass production grinding problem, let Van Norman Engineers help you solve it. Write for their help, today.

Don't wait . . . for extra profits install a Van Norman Machine now! They are available on five purchase plans — Outright sale . . . Purchase on conditional sales contract up to five years . . . Pay as you depreciate . . . Straight lease . . . Lease with option to buy. See your dealer or write Van Norman Company. Lease and Conditional Sales Contracts not available to Export.

Sketches illustrate actual grinding applications performed for users of single and double head plunge cut special purpose grinding machines.



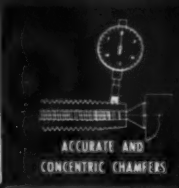
VAN NORMAN MACHINE COMPANY

SPRINGFIELD 7, MASSACHUSETTS

Manufacturers of — **Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.**

Circle No. 231 on Card, Opposite Page 65

PRECISION CHIP
DRIVER CONTOURS


ACCURATE AND
CONCENTRIC CHAMFERS

EXACT FLUTE SPACING

UNIFORM
FLUTE CONTOURS

FOR A PRODUCTION BONUS—

BALANCED ACTION

There are many mechanical and technical superiorities in the design and manufacture of Winter Balanced Action Taps. These give you a production bonus in size control and in prolonged tool life.

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Distributors in principal cities. Branches in New York • Detroit • Cleveland • Chicago • Dallas • San Francisco • Los Angeles • Division of National Twist Drill & Tool Co.

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A wide range of End Mill styles and sizes are immediately available from National stocks. We also design and make End Mills for many special applications. When applications call for laboratory research, write our Engineering Department.

Now available – a new catalog of National carbide tools.

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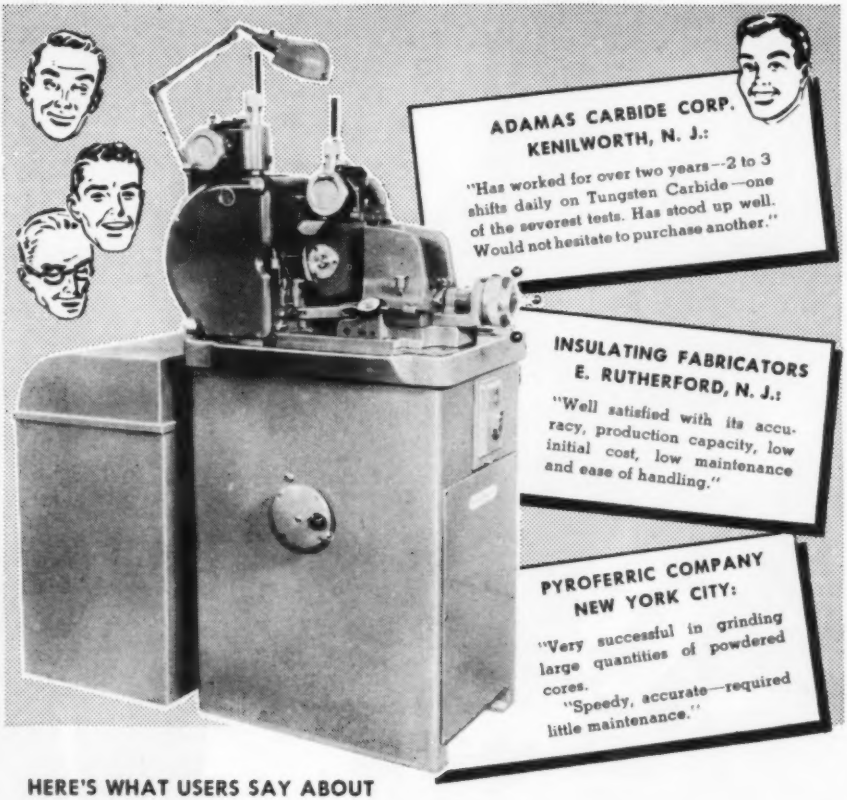

ADAMAS CARBIDE CORP.
KENILWORTH, N. J.:
"Has worked for over two years—2 to 3 shifts daily on Tungsten Carbide—one of the severest tests. Has stood up well. Would not hesitate to purchase another."
INSULATING FABRICATORS
E. RUTHERFORD, N. J.:
"Well satisfied with its accuracy, production capacity, low initial cost, low maintenance and ease of handling."
PYROFERRIC COMPANY
NEW YORK CITY:
"Very successful in grinding large quantities of powdered cores.
"Speedy, accurate—required little maintenance."

HERE'S WHAT USERS SAY ABOUT

THE *New* LOW COST Royal Master CENTERLESS GRINDER

Royal Master handles work up to 1″ diameter—and many pieces up to 1½″. Tolerances as low as .0002 consistently held. 6-8 micro inch finishes easily obtained. Requires only 24″ x 58″ of space.

The experience of these firms and others using the Royal Master Centerless Grinder proves its efficiency. We will gladly demonstrate it grinding your product.

But best of all, the Royal Master is priced within the means of even the smallest machine shop. It can be working in your shop or department at up to 50% of what other centerless grinders will cost you.

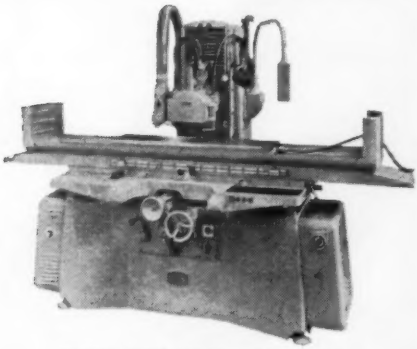
Write today for 6 page descriptive folder and prices.

ROYAL MASTER INC.

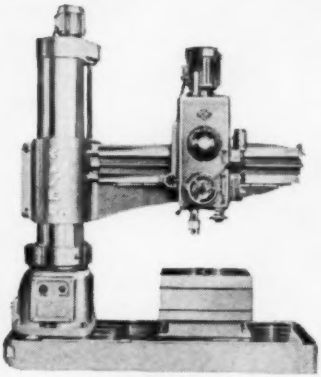
220 STATE HIGHWAY 23
RIVERDALE, N. J.

Circle No. 234 on Card, Opposite Page 65

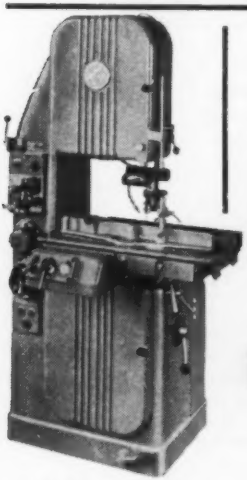
Outstanding NEW MACHINERY at low cost!



BLOHM HYDRAULIC HORIZONTAL
SURFACE GRINDERS
14" x 18" to 14" x 60" capacity

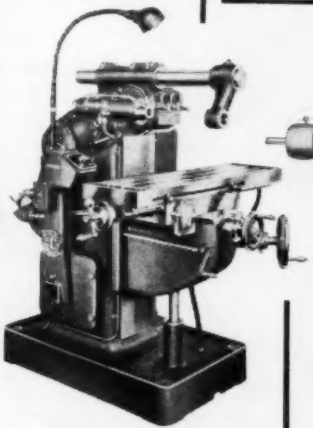


CASER RADIAL DRILLS
2½ ft. to 8 ft. arm lengths

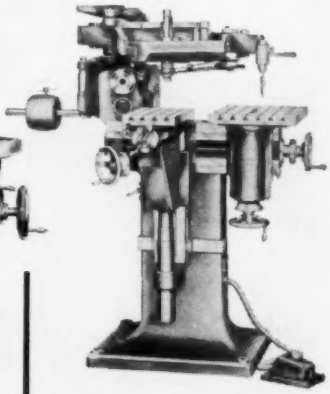


KOLLE CONTOUR
CUTTING MACHINE
AND VERTICAL
METAL CUTTING

BANDSAW $1,695.00



ABENE COMBINATION,
VERTICAL-HORIZONTAL
MILLING MACHINE
$3,990.00

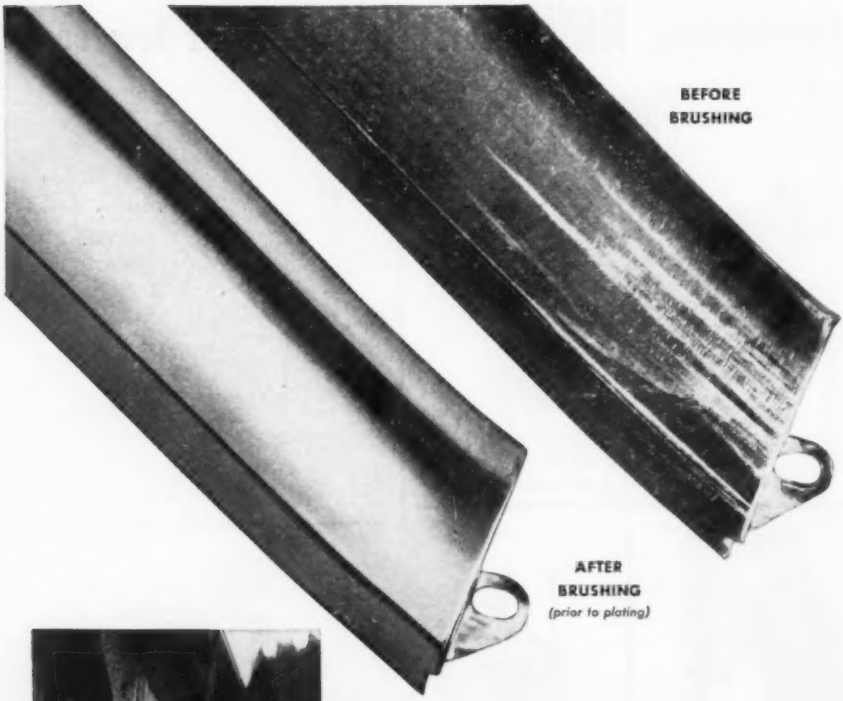


PEAR 3 DIMENSIONAL
AND 2 DIMENSIONAL
ENGRAVERS
PANTOGRAPH
$1,695.00 - $2,695.00

Liberal Terms!

AARON MACHINERY CO., INC.

Dept. B, 45 Crosby St., N. Y. 12 • WAlker 5-8300



An important manufacturer of trim uses a continuous 7-head-line of Osborn Fascut® Brushes to finish trim prior to plating at the rate of 1,000 feet per hour.

Keeping in top trim

MAKING a metal product, you undoubtedly use the smooth, mirror-lustre of chrome trim to add eye appeal—and buy appeal—to your product.

And you can further enhance the top-quality appearance of your trim parts—and your product—using Osborn power brushing to produce a perfect, unmarred finish prior to plating.

An **O**sborn **B**rushing **A**nalysis of your other finishing operations may point up additional ways power brushing can help improve quality. Write *The Osborn Manufacturing Company, Dept. L-19, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Circle No. 236 no Card, Opposite Page 63

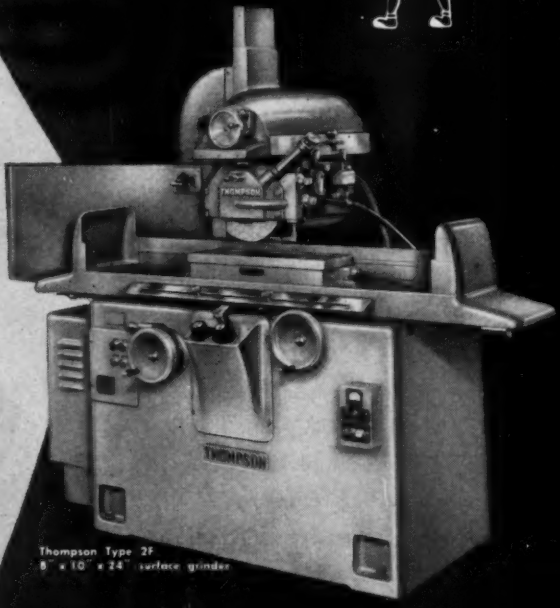
PRECISION PETE SAYS:

Only Thompson Type 2F Grinder has all three available . . .

1 COOLANT THRU THE WHEEL . . .

2 . . . COOLANT EXTERNALLY ON THE WORK . . .

3 . . . AND "IN POSITION" WHEEL TRUING



Thompson Type 2F
8" x 10" x 24" surface grinder

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SURFACE GRINDERS

WRITE TODAY FOR DESCRIPTIVE DATA

THE THOMPSON GRINDER COMPANY
SPRINGFIELD, OHIO

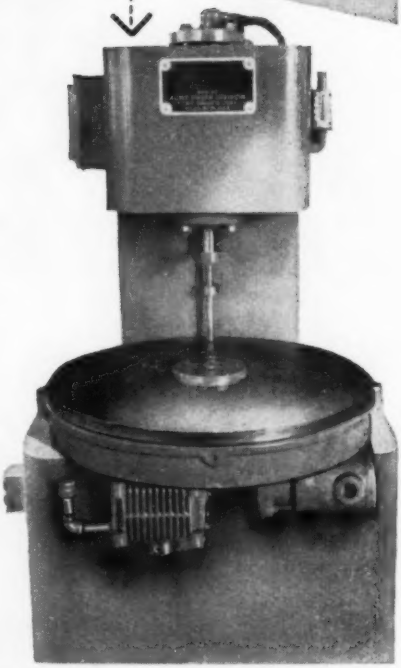
Thompson SURFACE Grinders

Copyright 1956 The Thompson Grinder Company

ACME HYDRAULIC BENCH PRESSES

as required for your job!

With simple and inexpensive tooling, these versatile hydraulic presses may be arranged for such operations as STAKING, FORCING, CRIMPING, TRIMMING, BENDING, BALLIZING, BROACHING, ASSEMBLING, PUNCHING, FORMING, MOLDING, STRAIGHTENING and many others. In most cases ACME PRESS DIVISION is able to supply complete tooling for YOUR use including required fixtures, index tables or work feed arrangements. Write, wire or phone today for complete information on these useful and productive units.



Acme Hydraulic Bench Press shown above is equipped with hydraulic index table for continuous cycle high production operation. Operator merely loads work parts and unloads them after passing under the ram station.

23 DIFFERENT MODELS

to suit your needs and applications

ACME PRESS DIVISION

ACME BROACH CORP. • MILAN, MICHIGAN

Circle No. 238 on Card, Opposite Page 65

Twice the performance at half the cost . . .

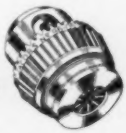
It's a *Jacobs* CHUCK

Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

THE JACOBS MANUFACTURING COMPANY • WEST HARTFORD, CONN.

The Jacobs Plain Bearing Chuck for drill presses, portable electric and air tools.

The Jacobs Rubber-Flex® Tap Chuck for tapping heads and impact tools.



The Jacobs Model 96 Collet Chuck for grinding machines, millers and jig-borers.

The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use.

The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.

The Jacobs Impact Keyless Chuck especially designed for the aircraft industry.

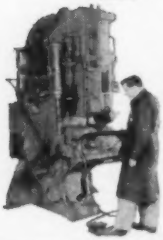
Every drill you grind on a
SELLERS Drill Grinder
cuts exactly like a new one!

●

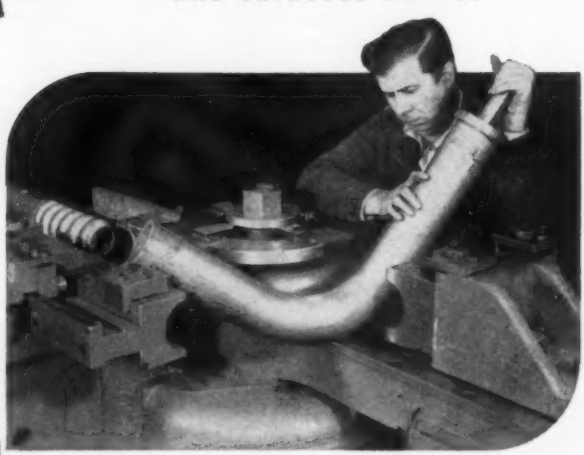
CONSOLIDATED MACHINE TOOL COMPANY
ROCHESTER, NEW YORK
A DIVISION OF FARREL-BIRMINGHAM COMPANY, INC.

4 COST-CUTTING SOLUTIONS

FOR FABRICATORS OF TUBING, PIPE, MOLDINGS AND EXTRUDED SHAPES



PINES 20-TON BENDING PRESS—Speeds production of automotive tail pipes, completes some jobs 50% faster by eliminating work handling. Up to 10 bends produced in a single progressive operation, most jobs completed in one handling.



PINES SIZE 4 BENDER—Now cold forms ultra-thin 4" x .020" stainless steel tubes for aircraft to 8" c/l radius. Ability to form these sharp, small radius bends without wrinkles saved $14,000 per plane for an aircraft manufacturer.

PINES SEMI-AUTOMATIC BENDER—Capacity up to 300 bends per hour, for applications where output does not require speed of fully automatic machines. Hydraulic power assures accurate, highly uniform results. Economically tooled, easy for women to operate, requires up to 60% less floor space.

PINES END-FINISHING MACHINE—3" capacity, floor-mounted unit with air clamping. Speeds deburring, facing, painting, or light hollow mill turning. Available with manual or air spindle advance. Other units also provided for smaller and larger work.

● Since 1941, when Pines Automatic Hydraulic Bending Machines were first introduced, more and more plants fabricating tubing, pipe, rods, moldings, rolled and extruded shapes, have found it profitable to standardize on Pines Machines. Dependable accuracy, combined with fast, more efficient operation are two of the major reasons why hundreds of commercial and industrial plants have turned to Pines to find cost-cutting solutions to bending and end-finishing problems. A study of the four examples shown here may suggest how you may profitably take advantage of the latest developments in fabricating the "Pines-way".

WRITE FOR *Free* DATA SHEETS

For additional cost-cutting ideas, write today for free copies of "Pines News"—illustrates latest bending and end-finishing techniques applied to actual jobs. And call on Pines engineers for assistance on any job.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery 692 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

Circle No. 241 on Card, Opposite Page 65

Write for a copy of the
OTTAWA 60 BLUE SHEET
This Blue Sheet contains certified data on the physical characteristics of Ottawa 60, prepared from carefully checked laboratory and field service tests. All the information you'll need on methods of handling and heat treatment, etc.
ADDRESS DEPT. MD-77

OTTAWA 60 is a *new* die steel, an A-1 "original," developed primarily to deep draw and form stainless steel. As intended, it performs without galling or pickup and shows exceptional wear resistance in that service. We have plenty of case histories to show you in proof.

But *wherever* you use Ottawa 60 draw dies—not just on stainless steel—this high-carbon, high-vanadium alloy comes through for you. Illustrated above are the first and second draws on transformer housings, produced from .037" gauge SAE 1010 strip. The company formerly used dies made of 5% chrome air-hardening die steel—and later a more highly alloyed material—without ever getting more than about 2000 pieces before the dies began to show gall marks and pickup, and parts were rejected due to scoring, breakage and oversize. *Dies made from Ottawa 60 forgings cured that! Results after 25,000 pieces showed no pickup and no wear on punch or die.*

● You can solve many a problem and save real money with Ottawa 60 draw dies! Write for information or call in our Field Service Staff to help you get started. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

For complete **MODERN** Tooling, call

Allegheny Ludlum

WAD 8463

AL
FINE TOOL STEELS
SINCE 1854

Circle No. 242 on Card, Opposite Page 65

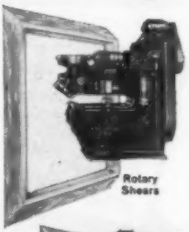
KLING COMBINATION
SHEAR, PUNCH AND COPER

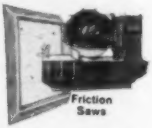
Its Magic Performance Can Win You Many "Production Oscars"

This "jack-of-all-jobs" will do the work of a half dozen machines, yet it does not take up any more floor space and represents very little more investment, than a shear or punch, or any other single-purpose machine.

Here is another production-boosting and cost-cutting feature: with this versatile machine two men, working on each side of the machine, can turn out the same or totally different jobs, at the same time! Enables you to double output, using your present staff.

Available in 3 sizes for light, medium or heavy work. Kling Combination Shear, Punch & Copers are speeding production and cutting costs "in the best of companies." Write us for names of some of these firms in your industry—and also for a copy of the New Kling Combination Bulletin No. 347-A.


Rotary Shears


Friction Saws

Since 1892 For data on other Kling Metal Working Machines ask for Bulletin 100

Kling

Active Kling Distributors cover practically every marketing area of U.S. and Canada. Write us for name of one nearest you.

1244MM

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Exclusive Canadian Distributor: Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont.

Export Distributor: Simmons Machine Tool Corp., 50 E. 42nd Street, New York 17, N. Y.

Circle No. 243 on Card, Opposite Page 65

TO PROVIDE A SOURCE FOR KELLY REPLACEMENT PARTS

Davis Boring Tool Division, long the outstanding name in tooling, now further extends its leadership in service! Acquisition of the Kelly Reamer Company of Cleveland, Ohio, permits Davis to offer a more complete cutting tool service. Sales and service for the Kelly line will be handled by the nation-wide network of Davis representatives and field tool engineers. Individual identity of the Kelly line will be maintained, assuring users ready replacement parts for Kelly equipment now in use. Make Davis your "tooling headquarters," secure in the knowledge that you will continue to receive equipment built to Davis standards of precision, productivity and unrivalled quality.

DAVIS BUYS KELLY'S TOOLING SERVICE, AND NOW OFFERS ITS COMPLETE TOOL LINE AND REPLACEMENT PARTS THROUGH A NATION-WIDE GROUP OF DAVIS REPRESENTATIVES

PLEASE SEND NAME OF DAVIS REPRESENTATIVE WHO WILL SERVE MY NEEDS IN THE KELLY REAMER LINE

NAME

TITLE

COMPANY

ADDRESS

CITY

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DAVIS

BORING TOOL DIVISION

Giddings & Lewis Machine Tool Company · Fond du Lac, Wisconsin

Models 400 and 600 Erickson Speed Indexers. Standard index plate provides 4, 6, 8, 12 and 24 positions; special parts provide up to 50 positions on Model 400, up to 100 positions on Model 600. Other models available.

Angular accuracy within 2 minutes... repetitive accuracy in low "tenths" of a thousandth

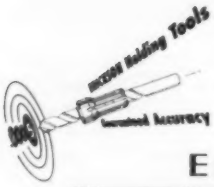
ERICKSON INDEXERS–

the economical way to smash automation bottlenecks

Even the most elaborate automatic production line can bog down *expensively* without rapid and accurate automatic parts positioning.

That's where Erickson Indexers really pay off. For you can interlock them into your production set-up with micro switches and solenoid valves. The hardened and ground lock pin operates in conjunction with the actuating mechanism to assure *positive positioning and angular accuracy within 2 minutes of a degree.* (Repetitive accuracy is no indication of angular accuracy. Erickson holds repetitive accuracy in low "tenths" of a thousandth.) And Erickson Indexers can maintain this great accuracy because their adjustable, self-contained shock control unit delivers a cushioned rotary load to the mechanism, thereby reducing wear.

Speed to keep lines moving . . . accuracy to reduce rejects . . . long life to cut maintenance and capital investment – all add up to Erickson Indexers, the *economical* way to smash automation bottlenecks.



Write for Erickson Catalog K today! You'll find many interesting applications for all Erickson holding tools. Take advantage of our free engineering service. An Erickson field engineer will gladly work with you for production economy.

ERICKSON TOOL COMPANY

2311-5 Hamilton Avenue • Cleveland 14, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

AA-2257

Circle No. 245 on Card, Opposite Page 65

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Cuts Machinery Installation Costs up to 30%

It's always surprising how much you can save by mounting your machinery on Unisorb. Here are the four big money savers:

- **Forget about bolts and lag screws. No holes to drill, legs to center, floors to be patched.**
- **Save up to 30% on labor and materials.**
- **Heavy machinery can be on the job in hours — saves up to 80% on installation time.**
- **Unisorb holds for keeps, yet can be unbonded when required. No maintenance, no checking required.**

All this plus the ability of Unisorb to reduce transmitted vibration by as much as 85%!

Get this FREE book. Take advantage of this cost saving the next time you have a machine to install or move.

FE6-7

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Sales Representative: San Francisco
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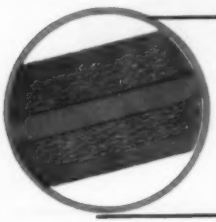

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Company.....
Street.....
City.....Zone....State.....

Circle No. 246 on Card, Opposite Page 65

MANUFACTURING SUCCESS

Is not solely the production of fine precision products at fair prices . . . rather it is the sum total of all the big and small services you'll receive when you use Whitnon Spindles.

MODEL D-158 SURFACE GRINDER

ALL WHITNON SPINDLES

are engineered for peak performance, precision finishing, lowest cost. The Surface Grinder Spindle gives successful continuous service in crush dressing and perfect contour grinding.

Engineered for Rigidity. Preloaded with special springs to eliminate radial and axial deflection — regardless of wear or temperature changes.

Engineered for Smooth Operation. Dynamically balanced by latest electronic equipment — faster sparkout.

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It's Powerful. Totally enclosed, 1 HP, 3600 RPM motor.

It's Lubricated for Long Life. Permanently grease-lubricated and sealed for any-position mounting.

Other WHITNON Spindles are available for original or replacement installation on boring, milling, grinding and drilling machines. Designs and assemblies available wherever precision revolving machinery is used. *Whitnon has a special 24-hour repair department for the rebuilding of all antifriction spindles.*

Please write for catalog or information pertaining to your specific application.

THE *Whitnon* MANUFACTURING COMPANY

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when you Buy

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Flat Ground Die Steel
It's Ready to Use!

Ask your Simonds Distributor for a copy of this New Chart (18 x 31") giving full range of Stock Sizes now available.

First cost is only part of the story when figuring die steel costs. Bar for bar you save with Simonds. Simonds Flat Ground Die Steel requires no costly grinding to size. It's *already* precision ground to 1001 stock sizes. What's more it's uniformly annealed and readily machinable. You save on time. You get better results. . . have a choice of OIL Hardening or AIR Hardening type.

OIL-HARDENING TYPE — Non-deforming, spheroidize-annealed for best machinability and consistently uniform hardenability from Simonds' own steel mill. Extra-smooth finish with all decarburization and surface defects removed. Wide hardening range. Individually packaged (18" and 36" lengths) with simplified heat treating instructions.

AIR-HARDENING TYPE — Non-deforming, spheroidize-annealed, 5% chrome — more wear-resistant yet easy to machine and heat treat with uniformly excellent results. Another product of Simonds' steel mill. Extra-smooth finish with all decarburization and surface defects removed. Wide hardening range (36" lengths). Individually packaged with heat treating instructions.

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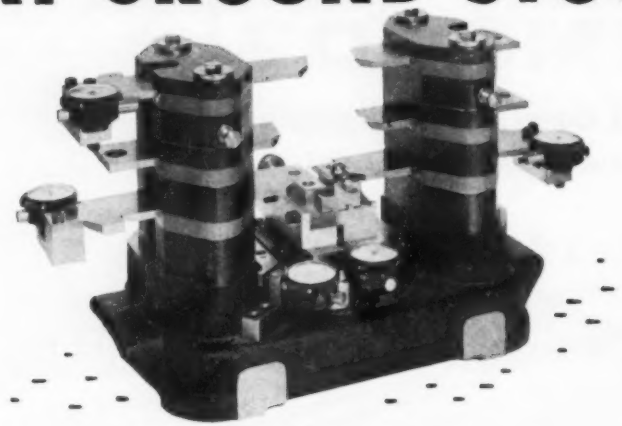
Circle No. 248 on Card, Opposite Page 65

Darwin **OIL HARDENING**

FLAT GROUND STOCK



CHECKS JET ENGINE *BLADES to ± .0005"

Shown is the Winslow Mfg. Company's Standard Guillotine Gauge on which most aircraft manufacturers and their suppliers check the accuracy of the airfoil on Jet Engine blades. Winslow uses Darwin & Milner flat ground stock for the templates which are pressed against the blades at several critical points. Winslow buys Darwin & Milner because of its superior finish, close dimensional tolerance and uniform hardness. If you require flat ground stock of this quality in any one of 1001 sizes—call on Darwin & Milner, or write for full information—NOW!

***These tolerances are often exceeded when the accuracy of the gauges are finally passed by Winslow.**

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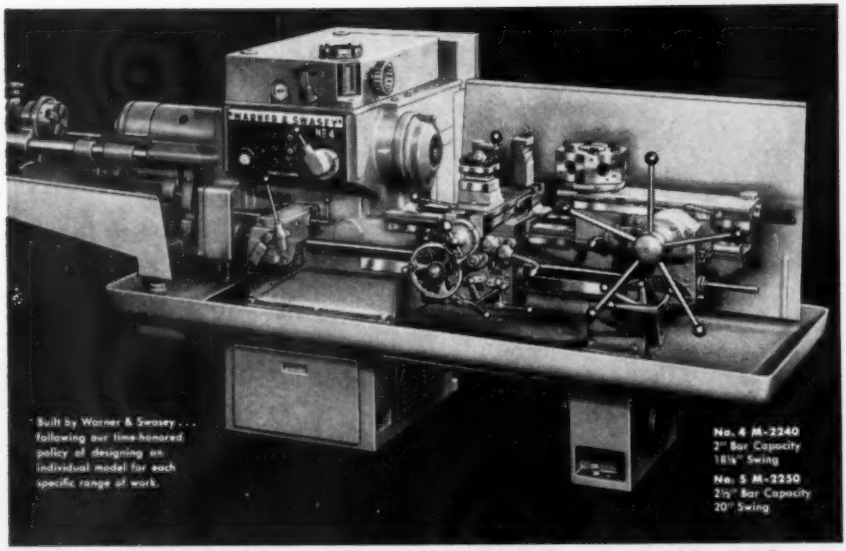
Circle No. 249 on Card, Opposite Page 65


Built by Warner & Swasey . . . following our time-honored policy of designing an individual model for each specific range of work.
No. 4 M-2240
2" Bar Capacity
18½" Swing
No. 5 M-2250
2½" Bar Capacity
20" Swing

NEW WARNER & SWASEY NO. 4 AND NO. 5 RAM TYPE TURRET LATHES

- Higher Speeds
- Instantaneous speed changes—sliding gears eliminated
- Direct-acting hydraulic clutches—need no adjustment
- Smooth, quiet running, helical high-speed gears
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- Patented direct-reading speed preselector—calibrated in rpm's, surface speed and work diameter
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- Retains Warner & Swasey standard tooling interchangeable with your present models

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS . . . . WITH A WARNER & SWASEY

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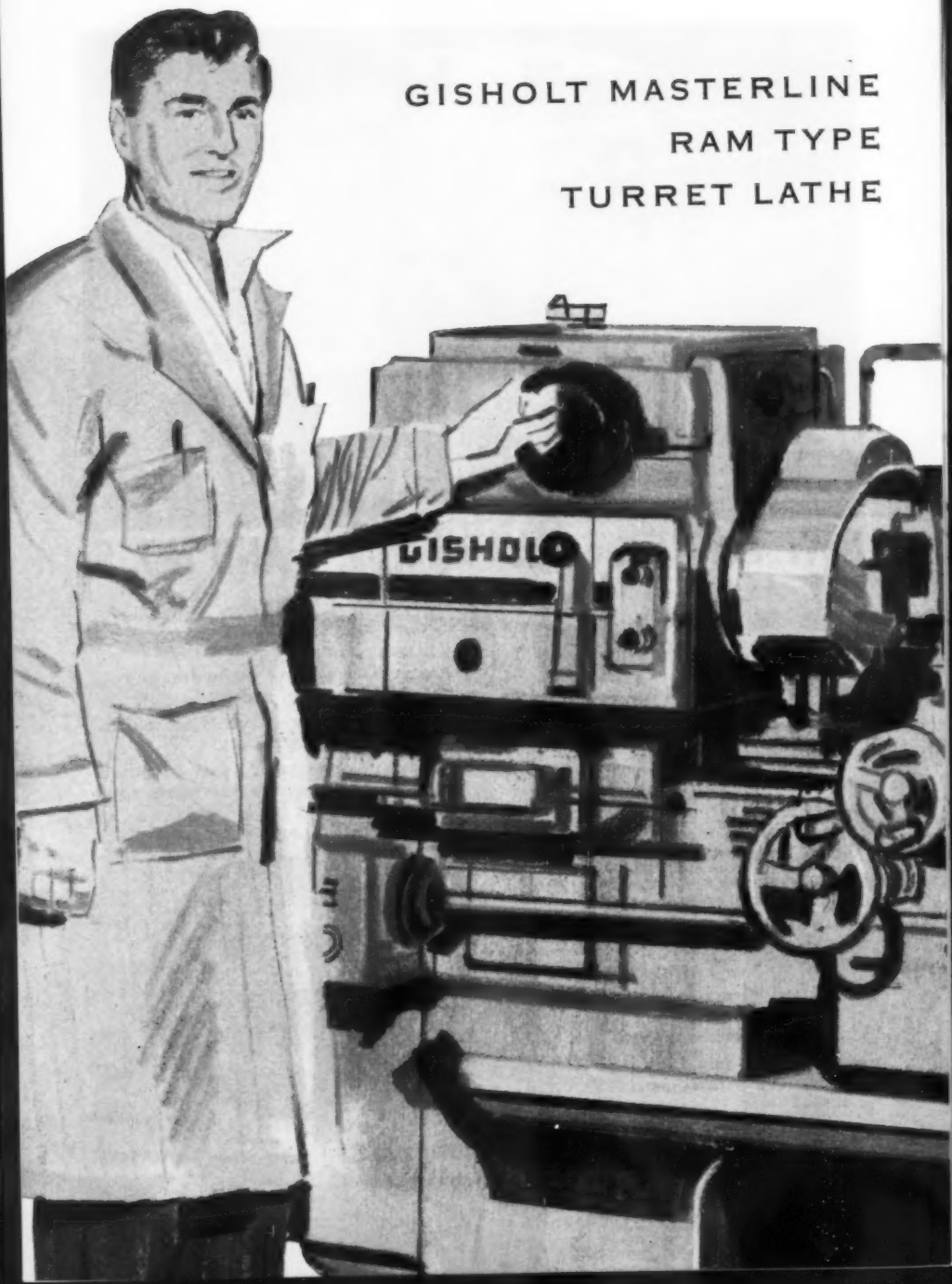
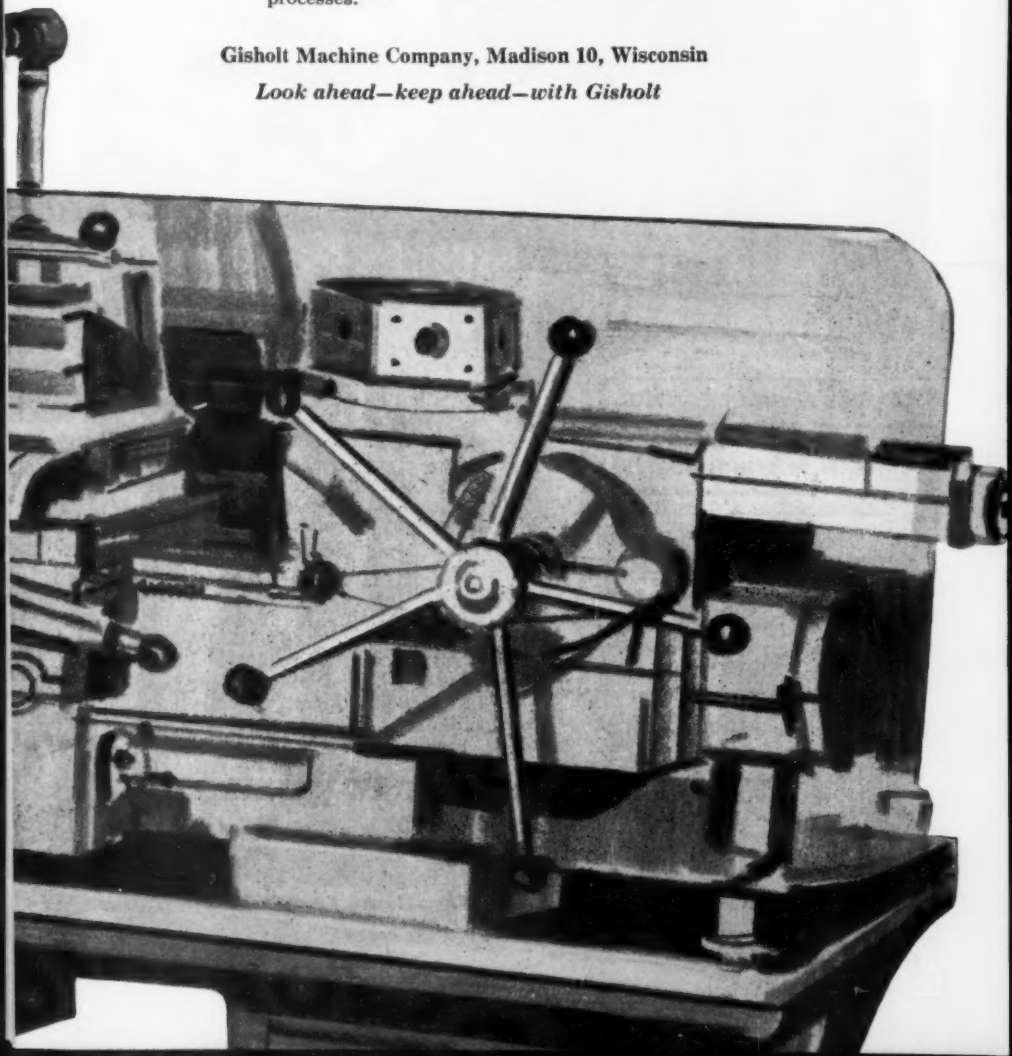
GISHOLT MASTERLINE
RAM TYPE
TURRET LATHE



Here is the latest Gisholt MASTERLINE Ram Type Turret Lathe, with many improvements and outstanding features to provide faster, easier operation, higher quality, quicker setup and lower maintenance. In short, it is designed to do your work faster, cheaper and better—and with a new minimum requirement for operator skill, attention and effort. Let us tell you more about these new machines, and discuss the possibilities of their profitable application to your particular manufacturing processes.

Gisholt Machine Company, Madison 10, Wisconsin

Look ahead—keep ahead—with Gisholt



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MILL-M-MATIC for Accurate, Heavy Duty Production Milling . . . .

Use This MILL-M-MATIC to Increase Your Milling Production!

Model 5-M-1842 Mill-M-Matic

- CENTRAL PENDANT CONTROL
- 25 H. P. SPINDLE DRIVE
- MECHANICAL TABLE FEED
- AUTOMATIC TABLE CYCLES
- RIGID OVER-ARM

You owe it to your production program to get all the details on this new *heavy duty* series of bed-type Mill-M-Matics. They utilize 25 horsepower through the spindle drive. Electrically controlled movements are mechanical to insure maximum rigidity and effective production with accuracy. . . The new Mill-M-Matic is now offered in a full range of heavy duty sizes by Motch & Merryweather, foremost builder of *traveling head* milling machines.

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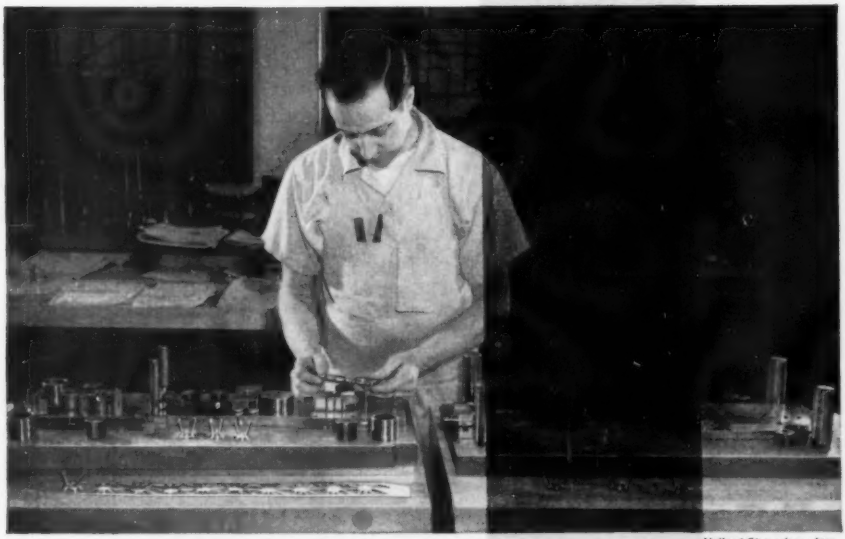
CLEVELAND 13, OHIO

Builders also of Circular Sawing Equipment, Vertical Turning, Automatic and Special Machines

Circle No. 252 on Card, Opposite Page 65

Why the Die Maker Prefers PRODUCTO Die Sets



Volkert Stampings, Inc.

The die maker likes to work with Producto Die Sets

He knows Producto die sets are easy to assemble —especially those equipped with the unique new Qwik-Fit Guide Pins*.

He has confidence in the consistent accuracy of Producto sets. He has found that they always align his dies correctly.

He knows he can choose from a variety of thicknesses the Producto die set that meets the strength requirements of his die.

He favors Producto die sets because they are dependable. They will perform on the press as well as they did in tryout.

He likes the attractive, streamlined appearance of Producto sets. They make his dies look better and increase his pride in these products of his craftsmanship.

*Patent Pending

He knows that a nearby Producto warehouse can supply any catalog die set he needs...and that orders for specials are promptly processed. He can count on having the die set by the time he needs it.

The die maker has found that all of his requirements are met by Producto die sets. You will, too, when you place your order with Producto.

DIE SET DIGEST, our eight-page quarterly, contains valuable data for designers, makers and users of dies. Write to have your name added to mailing list.

THE PRODUCTO MACHINE COMPANY
960 Housatonic Ave., Bridgeport 1, Connecticut

Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

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PROTECT METAL TOOLS & PARTS IN SHIPPING, HANDLING OR STORAGE

Thermo-Cote

STRIPPABLE PROTECTIVE COATINGS provide

- **RUST PREVENTION**
- **CUSHION PROTECTION**
- **HERMETIC SEAL**

Crystal clear for instant identification or inspection. Low cost — reusable.

Gov't approval to Spec. JAN C-149.

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203	228	253	278	303	328	353	378	403	428	453	478	503	528	553	578
204	229	254	279	304	329	354	379	404	429	454	479	504	529	554	579
205	230	255	280	305	330	355	380	405	430	455	480	505	530	555	580
206	231	256	281	306	331	356	381	406	431	456	481	506	531	556	581
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208	233	258	283	308	333	358	383	408	433	458	483	508	533	558	583
209	234	259	284	309	334	359	384	409	434	459	484	509	534	559	584
210	235	260	285	310	335	360	385	410	435	460	485	510	535	560	585
211	236	261	286	311	336	361	386	411	436	461	486	511	536	561	586
212	237	262	287	312	337	362	387	412	437	462	487	512	537	562	587
213	238	263	288	313	338	363	388	413	438	463	488	513	538	563	588
214	239	264	289	314	339	364	389	414	439	464	489	514	539	564	589
215	240	265	290	315	340	365	390	415	440	465	490	515	540	565	590
216	241	266	291	316	341	366	391	416	441	466	491	516	541	566	591
217	242	267	292	317	342	367	392	417	442	467	492	517	542	567	592
218	243	268	293	318	343	368	393	418	443	468	493	518	543	568	593
219	244	269	294	319	344	369	394	419	444	469	494	519	544	569	594
220	245	270	295	320	345	370	395	420	445	470	495	520	545	570	595
221	246	271	296	321	346	371	396	421	446	471	496	521	546	571	596
222	247	272	297	322	347	372	397	422	447	472	497	522	547	572	597
223	248	273	298	323	348	373	398	423	448	473	498	523	548	573	598
224	249	274	299	324	349	374	399	424	449	474	499	524	549	574	599
225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600

	Inside Front Cover				Inside Back Cover				Back Cover			
Inserts:	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B	3C	3D

Company .....

Name..... Position.....

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City..... Zone..... State.....

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2	12	22	32	42	52	62	72
3	13	23	33	43	53	63	73
4	14	24	34	44	54	64	74
5	15	25	35	45	55	65	75
6	16	26	36	46	56	66	76
7	17	27	37	47	57	67	77
8	18	28	38	48	58	68	78
9	19	29	39	49	59	69	79
10	20	30	40	50	60	70	80

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1	11	21	31	41	51	61	71	81	91
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3	13	23	33	43	53	63	73	83	93
4	14	24	34	44	54	64	74	84	94
5	15	25	35	45	55	65	75	85	95
6	16	26	36	46	56	66	76	86	96
7	17	27	37	47	57	67	77	87	97
8	18	28	38	48	58	68	78	88	98
9	19	29	39	49	59	69	79	89	99
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Company .....

Name..... Position.....

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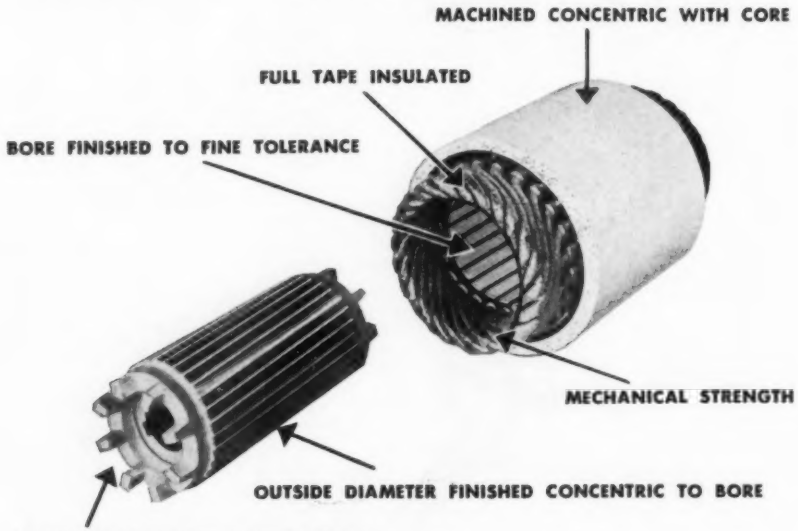
Serving the Industry Since 1852

WOODS SHAFTLESS MOTORS


MACHINED CONCENTRIC WITH CORE
FULL TAPE INSULATED
BORE FINISHED TO FINE TOLERANCE
MECHANICAL STRENGTH
OUTSIDE DIAMETER FINISHED CONCENTRIC TO BORE
VANES CAST INTEGRAL WITH ROTOR

The application of direct motor drive with WOODS' Shaftless Motors to high-speed spindles brings the peak of motive efficiency at relatively small cost. Conserves space—eliminates belts and gears—fewer wearing parts. The extensive and varied lines of WOODS' Shaftless Motors are available for nearly every class of direct application.

Let us tell you how you can achieve a reduction in production costs by direct motor drive.

MOTOR DIVISION

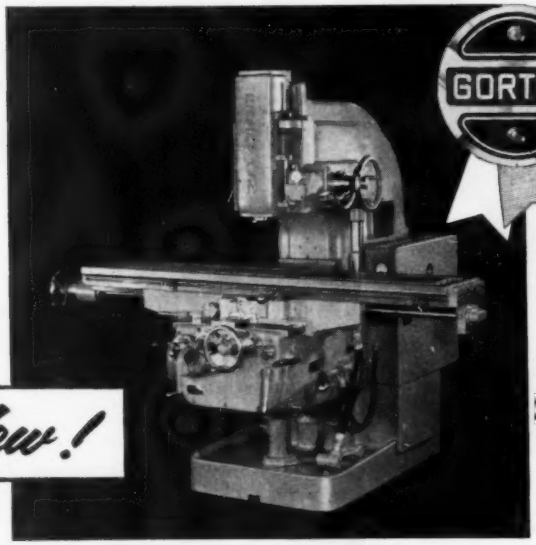
S. A. WOODS MACHINE CO.

27 DAMRELL STREET

BOSTON 27, MASS.

Circle No. 266 on Card, Opposite Page 65

GORTON PRESENTS A *Winner!*



Priced at $20,955

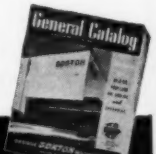
NEW GORTON 3-48 VERTICAL MILL

Compare These Features > with any No. 4 Milling Machine

- Designed for high-speed and carbide milling
- 76-inch table; 48-inch table travel
- 46-inch saddle with hardened wear plates at each end
- 24½-inch Fullwidth knee
- 15/7½ H.P. spindle motor — drives spindle only
- 5 H.P. feed motor
- 36 speeds; 25 to 2,000 R.P.M.
- 3 Feed Ranges available
- Square-Lock bearing guides with long length-to-width ratio
- Dial-type horsepower load meter
- Interchangeable Assembly unit construction
- 100% mechanical and electrical overload protection
- Removable coolant pan for easy clean-out

Above features also available in Horizontal and Universal models.

Write for Catalog 2585, which describes 3-48 Vertical Mills, and 1405-1655 Gorton General Catalog.



GORTON

SINCE 1893

GEORGE GORTON MACHINE CO.

1405 RACINE STREET • RACINE, WISCONSIN, U. S. A.

Tracer-Controlled Pantographs, Duplicators—standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

A 8736-1PA

Circle No. 267 on Card, Opposite Page 65

Leaders in their class

2 TON and 5 TON PRESS-RITE POWER PRESSES

Model O 5-Ton Press-Rite

Compare Feature for Feature

Note How Many "Long-Life" Features you get with "Juniorline" Press-Rite Presses . . . these are top-quality features you'd expect only on larger presses —at much higher cost!

- **Special High-Strength Frame** with reinforcing ribs at all vital points.
  —Reduces die-wearing deflection.
  —Increases Production between die grinds.
  —Gives 2 to 3 times longer die life!
- **Special Bronze-Bushed Flywheel.**
- **Bronze Bearings** in both the main bearings and connecting rod.
- **Bronze Wear Plate** on back of ramways.
- **Greatest Shut Height** for their size! Permits using larger, more bulky dies.
- **Adjustable Ram Gibs** for more precise alignment.
- **Open Back, Inclinable.**
- **Single Stroke Safety** (may be quickly arranged for continuous operation).

Yes, Press-Rite Power Presses are built-for-the-job. Save money in your plant, switch to PRESS-RITE . . . Top buy in the field!

10 MODELS: 2-Ton, 5-Ton, 10-Ton, 15-Ton, 20-Ton, 30-Ton, 37-Ton, 45-Ton, 60-Ton, and 85-Ton.

Write Today for Bulletin 955 and Name of your Local Distributor.

MODEL O 5-TON PRESS-RITE BASIC PRICE, ONLY ..... (Less Motor and Belt Guard) **$243.00** FOB St. Paul, Minnesota

SALES SERVICE MACHINE TOOL CO., 2357 University Ave., St. Paul 14, Minn.

PRESS-RITE

OPEN BACK • INCLINABLE *Power Presses*

Circle No. 268 on Card, Opposite Page 65

MILLING MACHINE ARBORS, ADAPTERS, ARBOR SPACERS AND BEARINGS

Hardened and ground to high standards of accuracy and quality.

These products are built by long established, reputable West German manufacturers, and tested for performance to American standards. Immediate delivery from New York City stock at low competitive prices.

Also available:

- *Multi purpose vises*
- *Tapping attachments*
- *Lathe mandrels*
- *"Wille-Grip" keyless drill chucks*
- *Large variety of machine tools*

MBI

QUICK CHANGE CHUCKS & COLLETS

All parts hardened and ground. Simplicity of construction insures trouble-free operation.

Our headquarters in New York City

Write for complete details and prices to Dept. 303

M.B.I. EXPORT & IMPORT LTD.

A Division of Machinery Builders Inc.

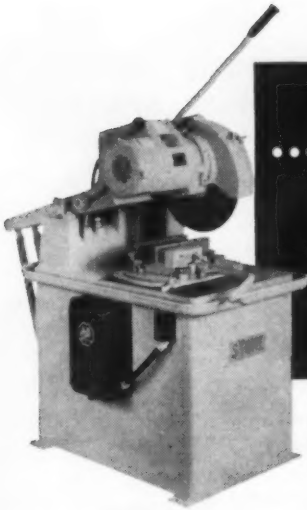
475 Grand Concourse, Bronx 51, N. Y.

"Over 20 years experience in designing and building machinery"

CABLE ADDRESS: Machbuild New York

Phone: MOtt Haven 5-0900

Circle No. 269 on Card, Opposite Page 65



...Cuts hardened tool steel Increased production over 5 TIMES*

Model M75 "Heavy Duty" cut-off machine.
Capacity: 2½" solids, 4" pipe and structurals.

A large Detroit tool shop formerly teamed a power hack saw with a band saw for cutting hardened tool steel.

These two machines were replaced by a single model M75 cut-off machine. **Result* . . . Model M75 increased production over 5 times.

Cost data proves tremendous economy of Stone machines compared to other methods.

- **Cuts any metal** — ferrous or non-ferrous — in 2 to 4 seconds per sq. inch.
- **Used for cutting** bar stock, pipe, tubing, structurals, etc.
- **Leaves mill-like finish** with tolerance less than ± .005; reduces the need for further machining.
- **No change of characteristics** or hardening of stock.

Exclusive Features by Stone

- **Geared-in-head motor** delivers maximum power to cutting edge for greatest efficiency.
- **Self-centering vise** presents least arc of contact for faster cutting, longer wheel life.
- **Vise plate calibrated in degrees** permits speedy changeover from straight cutting to angular cutting up to 46°.

Optional Features

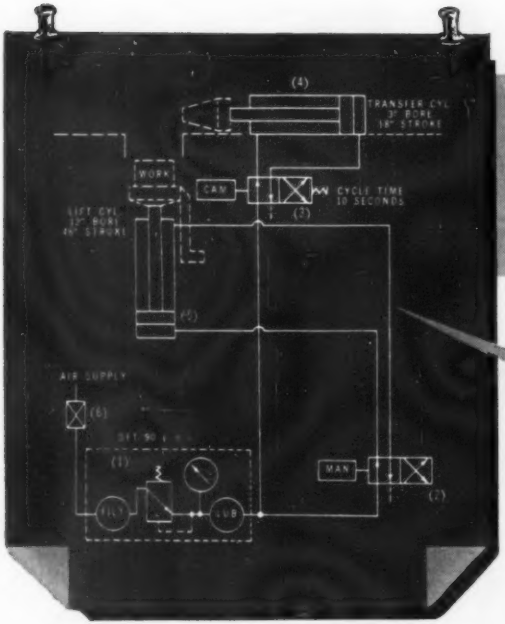
- **Semi-Automatic Power Stroke** provides simpler operation, minimizes operator fatigue; gives up to 25% longer wheel life.
- **Oil Mist Spray** attachment for cooler, easier cutting increases saw blade life up to 400% on non-ferrous materials.

Machinery by Stone includes a complete line. Let us help you select the equipment which will enable you to realize greater profits on your particular operations. Our representative will gladly discuss your requirements with you. No cost or obligation; simply write or phone.

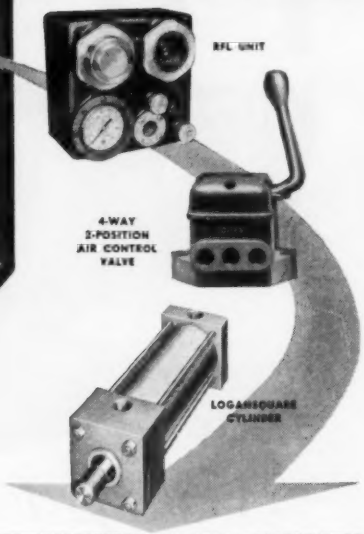
Stone Machinery Company, Inc.
11 FAYETTE ST., MANLIUS, N. Y.

"Cut-off machinery by Stone . . . represented in every major industry throughout the world."

Circle No. 270 on Card, Opposite Page 65



Logan AIR CIRCUITS



Write for FREE "Circuit Rider" booklet. It explains the above circuit plus many others.

how important is the RIGHT CIRCUIT?

One can't overestimate the importance of a properly designed and equipped circuit. Logan-designed circuits are operating all over the world. Let Logan engineers help you design the circuit to meet your production requirements. For a dependable ONE-SOURCE supplier of air and hydraulic equipment . . . specify Logan.

SAVES TIME Logan AIR AND HYDRAULIC EQUIPMENT EFFORT · MOTION

MEMBER
Natl. Mach. Tool Builders' Assn.;
Natl. Fluid Power Assn.

Your dependable SINGLE SOURCE for all air and hydraulic equipment

Logan

PROPERLY DESIGNED - PROPERLY EQUIPPED BY LOGAN

LOGANSPORT MACHINE CO., INC.
803 CENTER AVENUE, LOGANSPORT, INDIANA

Please Send Copy of Catalog:

- ☐ 100-1 AIR CYLINDERS
- ☐ 100-2 MILL-TYPE AIR CYLINDERS
- ☐ 100-3 AIR-DRAULIC CYLINDERS
- ☐ 100-4 AIR VALVES
- ☐ 100-5 LOGANSQUARE CYLS.
- ☐ 100-5-1 ULTRAMATION CYLS.
- ☐ 51 PRESSES
- ☐ FACTS OF LIFE
- ☐ 62 SURE-FLOW PUMPS
- ☐ 200-1 HYD. POWER UNITS
- ☐ 200-2 ROTOCAST HYD. CYLS.
- ☐ 200-3 750 SERIES HYD. CYLS.
- ☐ 200-4 HYD. VALVES
- ☐ 200-5 FITTINGS
- ☐ 70-1 CHUCKS
- ☐ ABC BOOKLET
- ☐ CIRCUIT RIDER

TO:

NAME_____ TITLE_____

COMPANY _____

ADDRESS _____

Circle No. 271 on Card, Opposite Page 65

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. . . *the preferred on every job*

for time-saving accuracy and dependability

Today, as for the past half century, Ames instruments are solving industry's toughest measurement problems, while providing unquestioned accuracy through millions of cycles.

We will gladly make recommendations on your measurement problems. Please send prints and specifications. And ask for your free copy of the Ames catalog.

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MANUFACTURER OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

Circle No. 272 on Card, Opposite Page 65

DRILL JIG BUSHINGS

A•S•A STANDARDS—From Local and Factory Stocks

...of chromium or chromium tungsten oil hardening steels having greater wear resistance than that of regular carbon water hardening steels.

Heat treated in neutral atmosphere, electronically controlled under automatic timing.

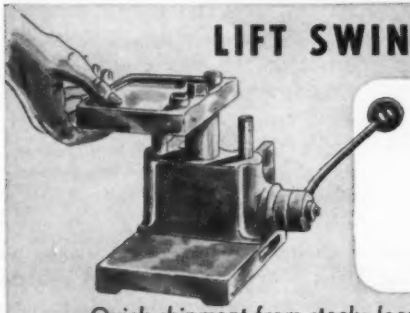
Accuracy • Concentricity • 20% Longer Service

PRECISION PIERCING PUNCHES

Precision controlled heat treatment and grinding. Made from high alloy steel. Initial high qualities are not reduced by grinding and resharpening.

Head, headless, also "ball lock" types, available in standard sizes from stock. Quick delivery on special sizes.

LIFT SWING DRILLING FIXTURE



"Swing away" top plate for faster and easier loading.

Back of fixture machined square to base for 90° operations.

Available in full range of standard sizes and with top plates in several styles.

Quick shipment from stocks located in principal industrial centers
Write us for catalogs of all three

ACCURATE BUSHING COMPANY

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Circle No. 273 on Card, Opposite Page 65

actual PERFORMANCE has the EDGE here!

Convex Cutter — Available in both standards.
Concave Cutter — Available in both standards.
Side Milling Cutter— Featuring our step tooth design.
Single Angle Cutter.
2-Flute Double End Mill.
4-Flute Double End Mill.

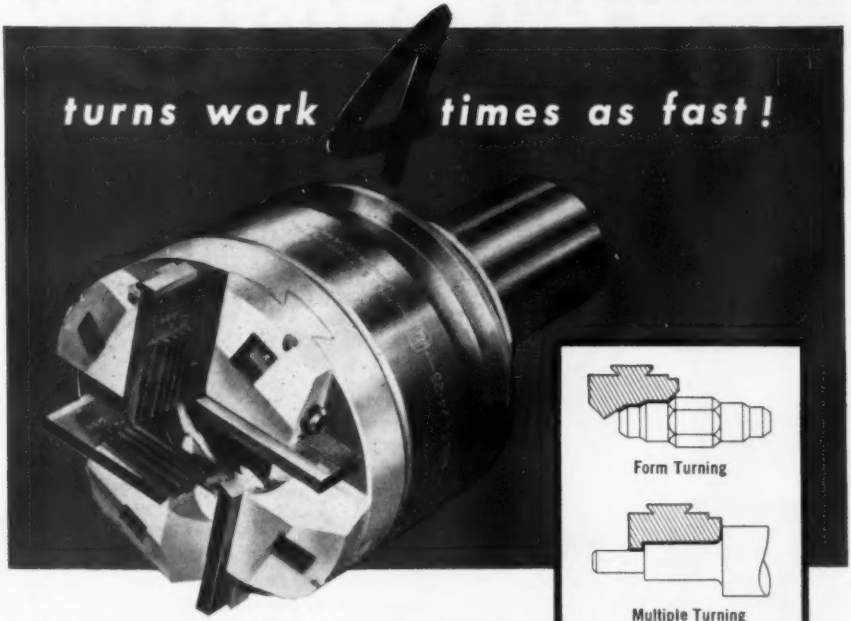
F & D Tools maintain the exacting standards of quality necessary to guarantee the most consistent cutting tools ever made. Our "Step Tooth" design assures you the most versatile tool available today. Write today for the address of your local distributor and our latest catalog.

FOR DISTRIBUTOR AREAS STILL OPEN PLEASE CONTACT

F&D TOOL CO., INC.
THREE RIVERS, MASSACHUSETTS

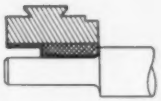
Circle No. 274 on Card, Opposite Page 65

Die Head
HOLLOW MILLING



Form Turning

Multiple Turning



Turn and Face with Carbide

Carbide chasers in J & L Die Heads have reduced hollow milling time still another 80% over H.S.S. chasers, while holding surfaces to 10 RMS.

In most cases, hollow milling chasers in J & L Die Heads will do plain turning, multiple turning and contour forming four times faster than any single point tooling method. (Each of the four chasers in the set does the work of a single point tool.)

Important!

Money-saving hollow milling chasers are held in the same J & L Die Heads that guarantee Class III threads — every time.

write for folder #5433

JONES & LAMSON

Class III Guaranteed
Not Sometimes, but Everytime!

J&L THREAD TOOL DIV.

JONES & LAMSON MACHINE COMPANY, 520 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

Circle No. 275 on Card, Opposite Page 65

GETTING SORE OVER *Soaring* SAWING COSTS?

If your sawing costs are mounting because you're not getting consistent low-cost operation, maximum production, and minimum downtime, call your Victor Distributor. He's the man who can bring your costs down to eye level. Once he's listened to your troubles, he'll recommend the *right* Victor Hand and Power Hacksaws, Metal and Wood Cutting Band Saws, and Hacksaw Frames for all your needs.

Your Victor Distributor will especially want to tell you about Victor "Moly"® High Speed steel blades. He'll tell you that "Moly" blades can save you real money because they outlast standard steel blades 10 to 1, cut as well as the *best* high speed steel blades made, and yet are substantially lower in cost!

And be sure to ask your Victor Distributor for a supply of our NEW Metal Cutting Booklets and Wall Charts. They're packed full of interesting information.

Sold Only Through Recognized Distributors

VICTOR

SAW WORKS, INC. • MIDDLETOWN, N. Y., U. S. A.

MAKERS OF HAND AND POWER HACKSAW BLADES, FRAMES, AND METAL AND WOOD CUTTING BAND SAW BLADES

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Circle No. 276 on Card, Opposite Page 65

Greatest new tool in years for maintenance and production

a high quality, low cost

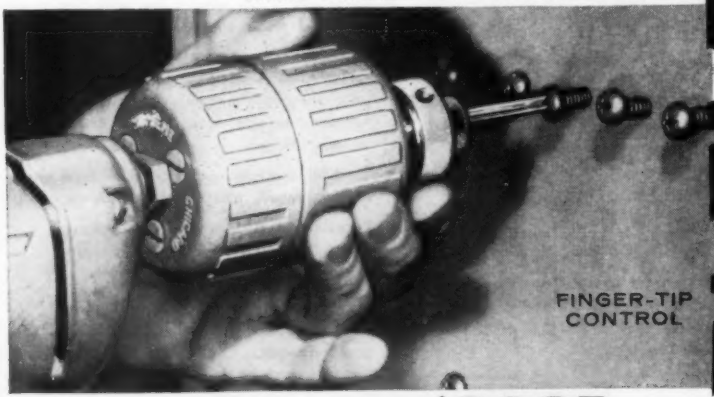
REVERSIBLE

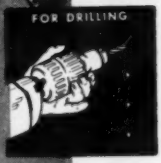
SPEED REDUCER

Fits all portable drills . . . reduces speed, increases torque seven times. Ask your distributors to show you the . . .

Supreme Versamatic

PROFESSIONAL MODEL
No. 4000-P
WITH YANKEE-TYPE BIT HOLDER





COMPLETE 14-PIECE SET . . . ONLY $24.95

Engineered and manufactured by the makers of

Supreme Chucks
BRAND

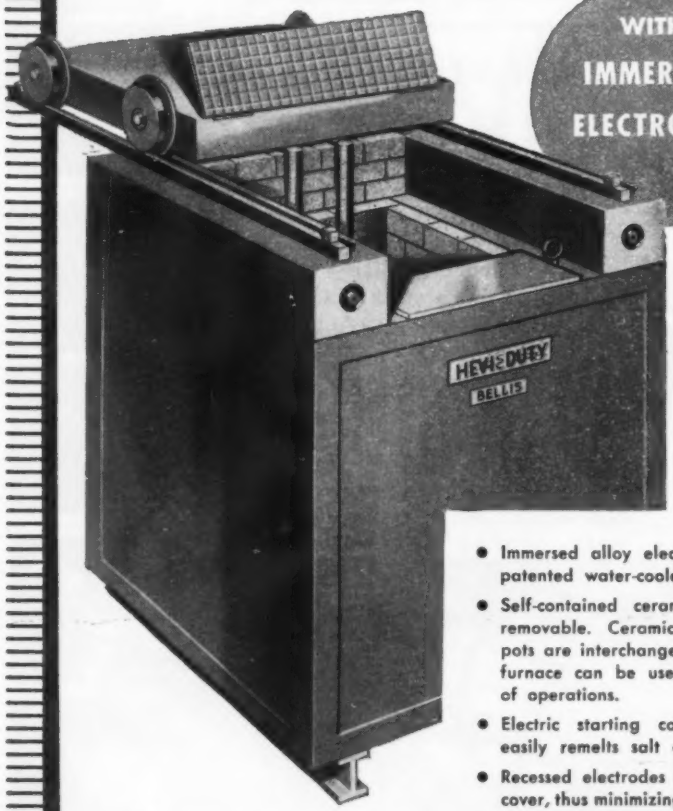
UP FRONT on America's leading power tools

SUPREME PRODUCTS, INC., 2222 S. CALUMET, CHICAGO, ILLINOIS

Circle No. 277 on Card, Opposite Page 65

HEVI DUTY-BELLIS
Salt Bath Furnaces

WITH IMMERSED ELECTRODES



Temperatures from 300° F. to 2400° F.

- Immersed alloy electrodes with the patented water-cooled terminals.
- Self-contained ceramic pot quickly removable. Ceramic, steel, or alloy pots are interchangeable — thus one furnace can be used for a variety of operations.
- Electric starting coil quickly and easily remelts salt after shut-down.
- Recessed electrodes permit a rolling cover, thus minimizing heat radiation.
- Sturdy construction means years of dependable service.
- Low operating voltage eliminates shock danger.

Built to any size or capacity with either a ceramic, welded steel, or alloy pot whichever the particular process requires.

Send for complete information in Bulletin 655

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

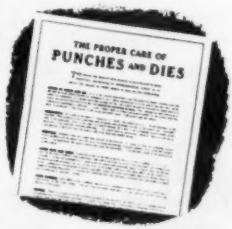
Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers ***Constant Current Regulators***

In stock 400 sizes of 21 standard CLEVELAND PUNCHES!

For your convenience we carry 400 sizes of our 21 standard punches and matching dies in stock. Punching diameters range from $\frac{5}{32}$" to $1\frac{1}{2}$". You will get prompt shipment of any standard punch. Special sizes or shapes will be made to your specifications.

Don't overlook the savings offered by the Cleveland system of standardization. You can punch any size hole from $\frac{1}{8}$" to $1\frac{1}{16}$" by using the same coupling nut and punch stem.



Are you obtaining maximum service from your Punches and Dies? Protect tool life—send for copies of our two-color wall instruction chart, "Proper Care of Punches and Dies."

A-5169

THE CLEVELAND PUNCH & SHEAR WORKS CO.
U.S.A.
Established 1880

PUNCHING TOOLS & DIES

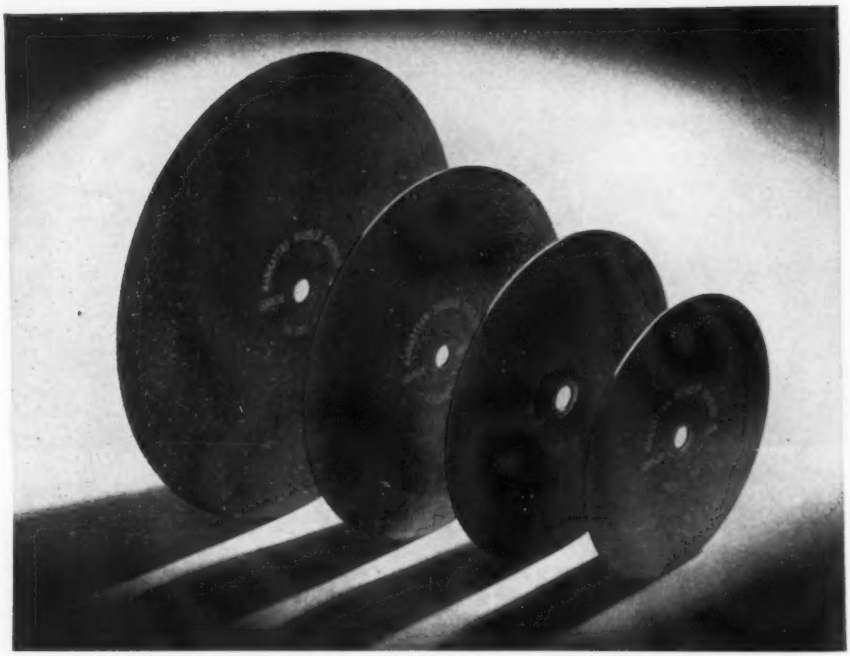
OFFICES AT
NEW YORK . . . CHICAGO
DETROIT . . . PHILADELPHIA
E. LANSING

FABRICATING TOOLS

CLEVELAND 14, OHIO

POWER PRESSES

Circle No. 279 on Card, Opposite Page 65



Cleaner Cutting...Longer Wheel Life with MANHATTAN CUT-OFF WHEELS

Every Manhattan Cut-Off Wheel is custom-bonded to cut cleaner at higher speeds on specific cut-off jobs . . . with hardened steel, soft steel, light gauge tubing or critical alloys. Factory records of the number of cuts per wheel have proved they do a better job . . . and *last longer* than any other wheels!

Manhattan Cut-Off Wheels are custom-manufactured for your specific requirements in the widest range of types and sizes. Let a Manhattan Abrasive Wheel engineer show you how you can save time and money . . . get "More Use per Dollar" . . . with Manhattan Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM-630B

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Circle No. 280 on Card, Opposite Page 65

Greater Magnetic Attraction . . .
More Efficient Design

Delpark

Gravity Type
High Capacity
Low Velocity Flow

Magnetic Separator

A new, more efficient design with gravity flow over an enormous, fully concentrated flat magnetic field to give the greatest, most efficient separation of ferrous sludge and abrasives from liquid.

- Greatest concentration of Alnico #5 Permanent Magnets.
- Most powerful magnetic field.
- Magnetic field doubled in width.
- Liquids flow on top of magnetic field — gravity assists magnets.
- Low velocity flow eliminates "washing" and turbidity.
- Depth of liquid held within magnetic field.
- Constant sludge removal by chain driven flights.
- Self Cleaning — Fully Automatic.

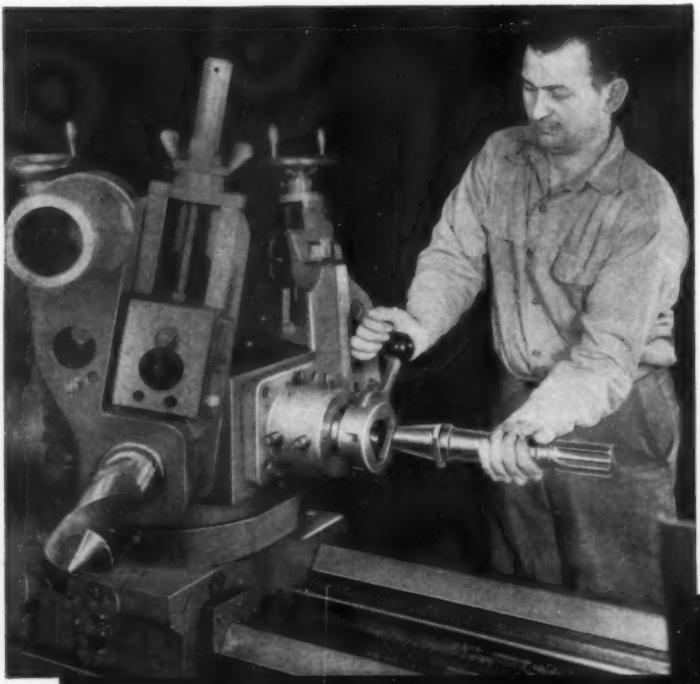
Delpark Magnetic Separators are available with adjustable legs, with dragout in tank, with collector tank or without tank. They are also used in combination with the famous Delpark Disposable media filter.

Delpark . . . first in filtration advancements

Write for more complete information

INDUSTRIAL FILTRATION COMPANY
LEBANON, INDIANA

Circle No. 281 on Card, Opposite Page 65



UNLIMITED Turret Stations...
FOR MULTIPLE OPERATIONS

A P.D.Q. (Portage Double Quick) Holder and Tool Adapter in one or more stations means an extra turret station or *unlimited* stations . . . depending on the number of operations. Just a slight turn of the lock nut releases the holder and you're set for a new tool and new operation . . . all in a matter of seconds. The new P.D.Q. method of tooling can cut costs to a fraction of former out-dated methods. Send for literature concerning complete information on THE NEWEST AND MOST MODERN TOOLING ADVANCEMENT IN INDUSTRY.

Representatives in Principal Cities

PDQ

PORTAGE Double-Quick TOOL CO.

1037 SWEITZER AVENUE • AKRON 11, OHIO

Circle No. 282 on Card, Opposite Page 65

FEATURES THIS MONTH

MACHINE AND TOOL
blue book

Interview with Dr. Haldon A. Leedy, Vice president and director of Armour Research Foundation, Chicago. This month's "Leaders of Thought" interviewee discusses important aspects of this country's research outlook in a stimulating and informative interview.

Page 97

Are we subsidizing the Soviet war machine? Read about the Senate inquiry into foreign shipments and other Capitol developments in Washington roundup.

Page 87

New Part . . . new process cuts production cost for GM's Detroit Transmission Division, by Jack Kenyon, Grinding and Finishing associate editor. How a combination of part redesign and process improvement has meant production economies in the Division's completely retooled plant is told in story and pictures.

Page 105

How to cut costs in use of portable pneumatic tools, by Hermann Reichard, consulting engineer. Analyze your permanent installation, get the right tool for each application, and maintain your equipment carefully for best results from your pneumatic tools is this expert's advice.

Page 113

Air power speeds gear case assembly. Special to Machine & Tool Blue Book. Methods men at Blackstone Corp., Jamestown, New York, are pleased with the efficiency gains they have made using pneumatic nut runners and other air tools in assembly line for automatic washer gear cases.

Page 120

It's cheaper to buy a new bit than to regrind the old one . . . Sintox . . . revolutionary cutting tool? by D. M. Carlson, Blue Book assistant editor. Demonstrated at the Tool Engineers' Show, this new synthetic tool exhibited some remarkable properties.

Page 128

Centerless grinding cuts part costs from 70c to 3c, by H. W. Merrow, Plant Manager, Lewis-Shepard Products, Inc., Watertown, Mass. The author discusses the outstanding gains in production economy realized when centerless methods were adopted for finishing long bar stock in their plant.

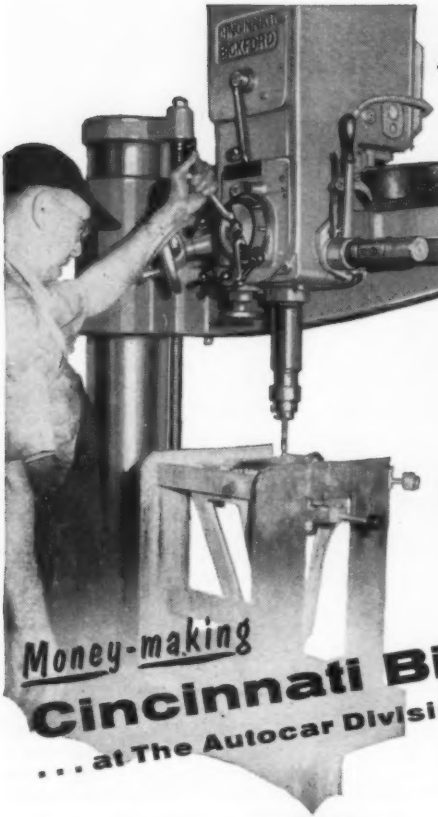
Page 132

Can he get a merit increase? Fire a disabled employee? These and other stimulating labor-relations questions discussed in Right and Wrong in Labor Relations.

Page 139

Proper selection of carbide face mills involves five factors, by Horace Frommelt, P. M. Cutter Co., Chicago. This is a thorough-going discussion of the basic factors in the use of face mills, with many helpful suggestions on their proper application.

Page 148



The 9' dia. column 3' arm Cincinnati Super Service Radial is working on chassis frame parts and aluminum steering column brackets; ¼" dia. to 1¼" holes drilled and reamed to a .0015" tolerance.

The Upright Drill shown is one of six 28" Super Service Uprights working on heat treated alloy steel frames.

Money-making Cincinnati Bickford machines ... at The Autocar Division, WHITE MOTOR CO. —EXTON, PA.

Photos courtesy the Autocar Division of The White Motor Company, Exton, Pennsylvania.

Speed and easy handling—power and accurate, steady performance were factors in the selection of Cincinnati Bickford Super Service Radial and Upright Drills in this plant. They are quickly adaptable to a variety of operations, including drilling, reaming, tapping and trepanning.

For rapid, accurate, dependable production investigate these cost reducing modern drilling machines.

Write for Bulletin R21C.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

CINCINNATI BICKFORD DIVISION

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Circle No. 283 on Card, Opposite Page 65

These Desperate, Prosperous Times

They say business is booming, the economy is expanding and the future twinkles brightly and untroubled like an evening star on a balmy spring night. This is good, indeed. We are delighted. Yet, at the expense of being labeled a crepe paper hanger, we must trumpet a warning: prosperity is the barbitol which lulls us gently and painlessly into dreamland. It's like falling asleep in a bath of warm water only to wake up in a bath of cold red ink.

These are the times when sales are 'satisfactory'; the over-all business volume is 'comfortable'; production is 'keeping up'; costs are 'hewing the line'. And this is a lot of nonsense!

This is no time for 'satisfactory' sales. That's for the competitor. This is the time for an expanded sales force, realignment of territories, additional sales promotion, advertising and marketing; only then can we increase sales and maintain pace with our expanding economy.

What is a 'comfortable' business volume? The same volume as last year? Less? More? One can be up over last year and be slipping in the profit column. One can be down in volume but up in profit. In either event, there's precious little comfort here. A Reynolds Metal executive recently said, ". . . the population growth of our country is such that a company has to do 10% better than last year just to stand still."

Think of it; 10% better just to stand still!

Why should production 'keep up' with anything? Production should pace the sales department.

The production executive must continually examine new methods and techniques for increasing production. If capital equipment is not replaced he will suddenly be faced with the disaster of old equipment trying to compete with a new manufacturer whose streamlined equipment and wide awake methods are ripping into his 'historic' share of the market.

'Costs are hewing the line!' Now, isn't this a precious thought? In an efficient organization costs are always out of line, everything always costs too much. We don't mean the efficient company is a Scrooge in disguise or run by money-counters, but the progressive company will spend a dollar to get five dollars back, and this is the basic difference between an enterprising, growing concern and a stand-still outfit.

Let us sum up our little trumpet call with this meditation from a successful businessman, "I always operated on the theory that times were desperate and business hard to get, and I've always been surprised to find a profit at the end of the year."

(Our wives ought to practice that philosophy with the household expenses.)

Wm. J. Schleicher

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ROUND-UP OF WASHINGTON NEWS

MACHINE AND TOOL
blue book

by
Arnold Kruckman
Blue Book
Washington
Correspondent

Business Failures Up. Senator Sparkman, Chairman of the Senate Small Business Committee, in a speech on the Floor of the Senate, asserted that the rate of business failures for 10,000 firms in 1954 and 1955 was considerably above the average failure rates for the years since the end of World War II. He urged his colleagues that they pay attention to this warning signal.

Says Senator Sparkman: "We must take steps during this Session of Congress to buttress the economic position of the more than 4,000,000 small firms; we must assure ourselves that Federal laws are completely fair as between small firms and their larger competitors. We must study the tax laws to lessen the impact of high taxes on small business; we must guarantee that antitrust and anti-monopoly laws are adequate and that they are administered vigorously and effectively."

What's Ahead? Representative Wint Smith of Western Kansas told the House recently that it is absolutely certain postal rates will not be raised this Session; new coverage for $1 minimum wage for clerks, salesmen, etc., will not be passed; the Taft-Hartley bill will not be changed; no change will be made in the immigration law; foreign aid will be cut some—but will be continued; the road bill in some form will be enacted; flood and disaster insurance will not be passed; Federal aid for education will not be passed due to the segregation issue in the South.

Are We Subsidizing the Soviet War Machine?

Senator McClellan's Committee, which has held hearings on violations by the Executive Department of the Battle Act, in all likelihood will make a report which will be available for distribution in April. It is expected to be one of the most startling bits of literature produced by the Legislative Branch of the Federal Government. It is of special interest to the machine tool industry for the reason that it reveals how Battle Act Administrator Harold E. Stassen permitted 77 machine tools to go to the Communistic group via Britain, France and similar countries with which we do business.

The list of 77 machine tools that were received by the Soviet Bloc, according to testimony at the hearings of the Committee, include hori-

continued

zontal boring machines to a value ranging from $200,000 to $500,000; also precision boring mills; and vertical boring mills. The list includes hydraulic and mechanical presses; surface grinding machines; dynamic balancing machines and other machine tools.

The machine tools, and other supplies that finally reached the Soviet Bloc went as U.S. aid to the nations that transmitted them. In the list of materials that were provided is copper wire; aluminum, magnesium; asbestos; talc; corundum; mica; 30% nickel alloy; 50% beryllium alloy; 60% zirconium alloy; 20% molybdenum alloy; power generators up to 60,000 kw, and turbines up to 85,000 hp. The list also includes electronic equipment, radio transmitters, tanks, artillery, aircraft, aircraft carrier catapult parts, atom reactors for "Nautilus" class submarines. Aircraft parts such as wings; shell casings; guided missile engines; gyros; jet engines; turbines; guided missiles; radar; aircraft engines; shells; transportation vehicles; cable insulation; gas mask filters; munitions hardware; jet aircraft parts; fissionable material; Diesel engines; steam locomotives; flat cars; other railroad equipment.

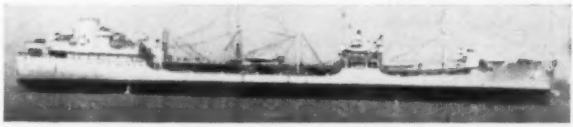
The Battle Act of 1951 expressed the desire of Congress "that no military, economic or financial assistance shall be supplied to any nation unless it applies an embargo on the shipment of arms, ammunition and implements of war, atomic energy materials of strategic value, and items of primary significance used in the production of arms, ammunition and the implements of war to any nation—in the Soviet Bloc."

The law said that termination of U.S. aid is mandatory if strategic weapons are shipped to the Communists. It provided that in case the President finds "unusual circumstances" and determines that cutting off aid would be "clearly detrimental" to U.S. security, strategic production materials may be continued as aid; but even in that case the President must immediately report the exception to Congress.

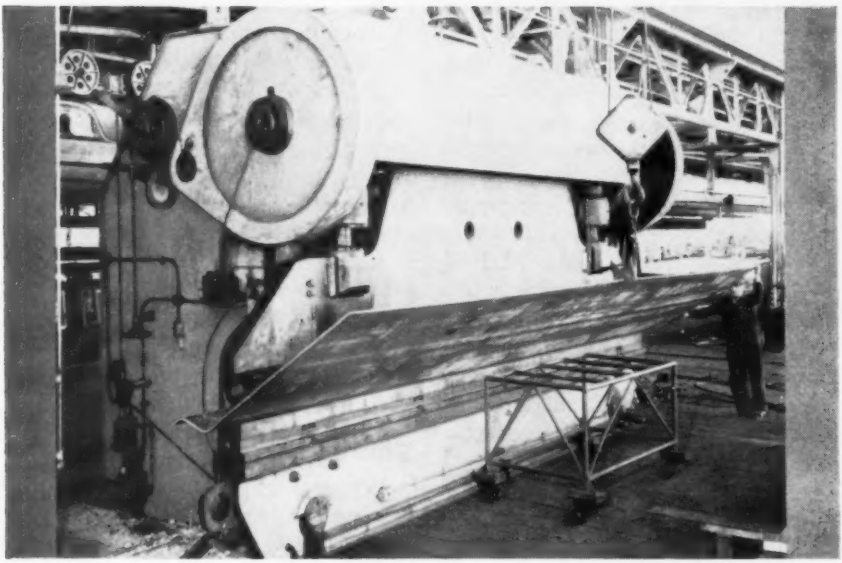
Stassen made up the list of exceptions without consulting the Economic Defense Advisory Committee or the National Security Council. These units which bore the responsibility for determining U.S. domestic and international embargo policy formed the Joint Operating Committee, and undoubtedly are the subject of much discussion in the report of the Committee. The report will show, according to testimony before the Committee, that Western European countries made the intensified pressures on the U.S. to relax the Anti-Communist embargo, and to liberalize the definition of what constituted strategic items.

Most of the violations, via the countries which benefited by reason of U.S. aid, apparently re-

U.S.S. KASKASKIA is typical of many ships which have had extensive bulkhead and other repairs at Moore Dry Dock Company.
Official U. S. Navy Photograph



Moore Dry Dock SPEEDS MARINE REPAIRS



Fluted bulkhead plate being formed by Steelweld bending press in plate shop of Moore Dry Dock Company for bulkhead renewal job on U.S.S. "KASKASKIA" (A027). Size of plate: length 26', width 6', thickness ½"

Long a leading West Coast ship builder and marine repairs concern, the Moore Dry Dock Company, Oakland, California, has found a large Steelweld Bending Press to be a great asset in speeding the forming of heavy plate.

Ship repair, which constitutes an important part of the company's business, often requires replacement of large sections, such as bulkheads. This necessitates the forming of plates to various shapes to accurately replace those removed. Because of the power of their Steelweld and the ease of making adjustments, this work is carried on efficiently and satisfactorily.

The entire line of Steelwelds has an enviable reputation for continuous high-production performance. We urge you to get the facts on their many outstanding features.

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Circle No. 285 on Card, Opposite Page 65

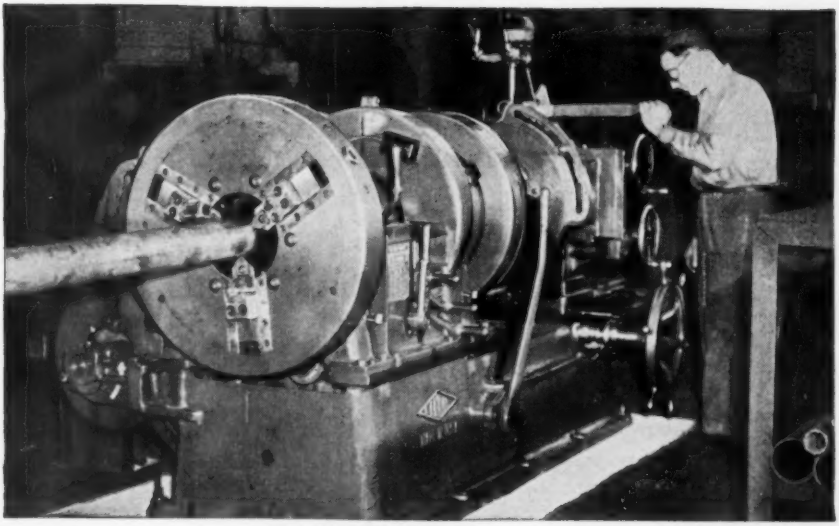
continued

sponded to the Soviet Government campaign late in 1953 on behalf of increased East-West trade. In 1954, just after New Year, a British trade mission went to Moscow and discussed with the Communists what they had in mind. Late in February, 1954, Churchill told the British Parliament the free world ought to relax its embargo against Eastern Europe. In March, the U.S. formally proposed a review of our international list. In April, 1954, Stassen met with the President of the British Board of Trade and the French Government counterpart in London and reached an agreement concerning the relaxation that was desired. The criteria for decontrols were reviewed and recast by meetings in this country of the Joint Operating Committee which included State, Defense, Commerce and Foreign Operations Administration and representatives of other groups. These meetings and their reports were approved by the National Security Council. The Defense Department vigorously opposed the deletions from the list. There was much objection from many parts of the Federal Government to the release of metals and minerals from the U.S. critical stockpile because they were in short supply.

Of course the transfer as aid of many tools and materials that were extraordinarily valuable to the Soviets brought protests from various segments of our Government. The standards of evaluation can be better understood by the fact that it was determined a given item should not be regarded as strategic if it was useful in peaceful industrial production as well as in war industry. Aluminum, it was held, can be used to produce pots as well as bombers, therefore aluminum could be sent to the Soviet Union. It also developed that the U.S. sent 200,000,000 pounds of copper wire via Britain to the Soviet Bloc, and that the U.S. provides a direct subsidy to British copper mines in Rhodesia. • • •

The Business Picture

What is happening to business throughout the country? There's little change in the high rate of business activity, government officials report. Industrial production, sales, and construction work in January were reported to be about the same as in December, and the highest for any January in history. Preliminary data indicates that business in February has followed much the same course. The forecasters, who have generally predicted that 1956 will show increases over 1955, have been able thus far to point out that the figures are running their way. Principal curtailment in production has been in passenger car automobile output;



Versatility Saves Time & Money in Maintenance Shops

Photograph shows a LANDIS Pipe Threading Machine installation in a Job Shop of the New York Central Railroad. This shop, located at Weehawken, New Jersey, operates as a Marine Repair Shop handling maintenance for tugs, barges, lighters, etc. Wrought iron pipe is being threaded, and will later be reamed and cut off on the same machine. Standard pipe threads are cut 1½" long on the 4" pipe, using a cutting speed of 25 surface feet per minute. This machine is also used for cutting boiler tubes to length.

The wide diametrical range of the die heads and the use of LANDIS tangential pipe chasers gives these machines a versatility invaluable in maintenance work. The 6" LANDIS Pipe Threading Machine illustrated threads all pipe sizes from 1" to 6" inclusive. Adjustment of the die head from one size to another is simple and quick. Chasers need not be changed except for threads of a different pitch, form or taper. Chasers are interchangeable and need only be replaced singly as needed. Tangential cutting action reduces wear, and chasers can be reground to use over 80% of their length. Write for Bulletin C-61.

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

Circle No. 286 on Card, Opposite Page 65

Washington News

continued

automobile sales have declined. At the same time there has been an increase in the output of machinery and equipment, trucks, building materials and steel.

Those who watch industrial evolutions most closely say that the reduction of passenger automobile output has now gone about as far as is necessary. They report that since mid-November, when output of 1956 models reached its peak, the cutback has been more than 30%. They also say they find that the decline in home building has leveled off despite severe weather. Contract awards for residential construction during the first ten weeks of 1956 were higher than a year ago, and Federal Housing Administration officials report that "mortgage money is more readily available in early 1956 than in other recent months." As an influence on general business, the weakness in housing construction is regarded as being past.

It is pointed out machinery and equipment industries are sold far ahead and are striving to increase output. The automobile industry alone is planning to spend approximately $2,000,000,000 in 1956 on expansion and modernization of its facilities, not including the extensive and costly retooling for 1957 models. In general, it is said that people appear to be spending as many dollars as heretofore, shifting from one type of purchase to another. At the same time it appears they are able to increase savings and are paying off some of their debts.

The Census Bureau in its recent report stated that more than 4% of the population of the United States is employed by Federal, State or local governments. Over 7,400,000 civilians are employed by government; of this number 2,378,000 are in the employ of the Federal Government; 1,250,000 work for State government and 3,804,000 work for local governments. The monthly payroll of all government was $2,264,500,000. Federal employees received $845,700,000; State employees, $340,400,000; and local government employees received $1,078,400,000.

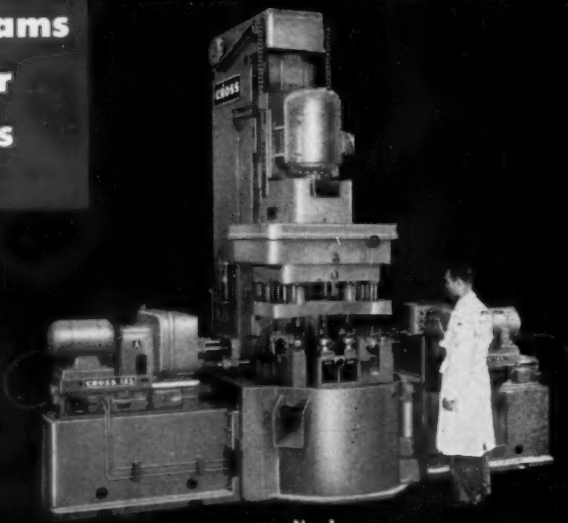
1954 Census of Business. The 1954 censuses of business, manufacturers and mineral industries are being published in a number of series of preliminary or advanced reports by the Bureau of the Census.

There will be area bulletins, in a separate bulletin for each State, totaling about 150 bulletins in all. And there will be industry advance reports for over 400 individual industries and separate bulletins for each of about eighty-two major industry groups comprising about 460 individual industries. There will also be separate bulletins for each State and Alaska in great general statistic detail, and separate bulletins for each subject.

• • •

More Specials by Cross

Bores, Drills, Chamfers and Reams Air Compressor Cylinder Blocks



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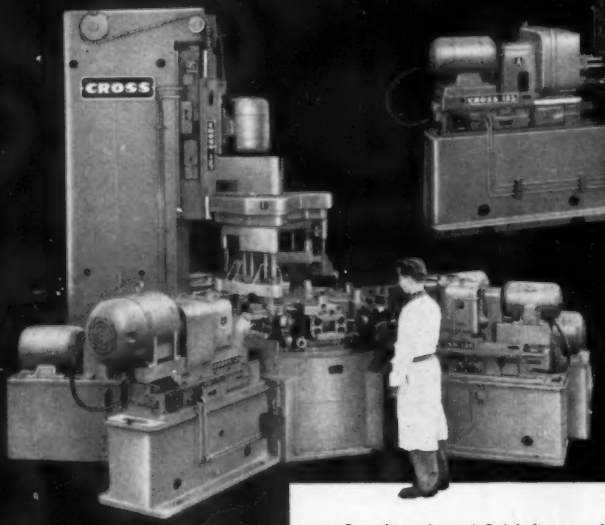

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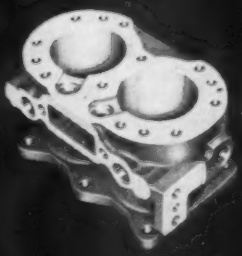

- ★ Rough and semi-finish bores cylinders; rough and finish counterbores valve ports; drills, chamfers and reams all holes.
- ★ 129 pieces per hour at 100% efficiency.
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MEETINGS CONVENTIONS EXHIBITIONS

May 3—Non-Ferrous Founders' Society Annual Membership and Dinner Meeting, Marlborough-Blenheim Hotel, Atlantic City, N.J. Society Headquarters—192 N. Clark St., Chicago 1, Ill.

May 3-5—American Institute of Mining & Metallurgical Engineers, Pacific Northwest Regional Conference, Mining and Metals Branch, Olympic Hotel, Seattle, Wash. Institute Headquarters—29 W. 39th St., New York 18, N.Y.

May 3-9—American Foundrymen's Society, Castings Congress and Exhibit, Atlantic City Hall, Atlantic City, New Jersey. Society headquarters—Des Plaines, Ill.

May 4-5—Marking Device Association, District 2 and 5 Meeting, Statler Hotel, Boston, Mass. Association Headquarters—912 Chicago Ave., Evanston, Ill.

May 7-9—American Mining Congress, Coal Convention, Netherland Plaza Hotel, Cincinnati, Ohio. Association Headquarters—Ring Bldg., Washington 6, D.C.

May 7-11—American Welding Society, Spring Technical, National & Welding Show, Hotel Statler, Buffalo, N.Y. Society headquarters—33 W. 39th St., New York 18, N.Y.

May 9-11—Investment Casting Institute, Spring Meeting, Hotel New Yorker, New York. Institute Headquarters—27 E. Monroe St., Chicago 3, Ill.

May 9-19—Mechanical Handling Exhibition and Convention, Earls Court, London. Press Officer—Maurice J. Seymour, Dorset House, Stamford St., London, S.E. 1.

May 10-11—Drop Forging Association, Heavy Hammer Maintenance Eng. Com., Houston, Texas. Association Headquarters—419 S. Walnut St., Lansing 33, Mich.

May 11—Malleable Founders' Society, Eastern Section Meeting, Hotel Commodore, New York, N.Y. Society Headquarters—Union Commerce Bldg., Cleveland 14, Ohio.

May 14-17—Design Engineering Show, Convention Hall, Philadelphia, Pa. Headquarters—Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N.Y.

May 15-16—Armour Research Foundation of Illinois Institute of Technology, Industrial Nuclear Technology Conference, Museum of Science and Industry, E. 57th and S. Shore Drive, Chicago, Ill. Foundation Headquarters—10 W. 35th St., Chicago 16, Ill.

May 16-18—Anti-Friction Bearing Mfrs. Assn., Inc., Princeton Inn, Princeton, N.J. Association Headquarters—60 E. 42nd St., New York 17, N.Y.

May 20-23—Industrial Heating Equipment Association, Inc., Spring Meeting, The Homestead, Hot Springs, Va. Association Headquarters—Associations Bldg., Washington 6, D.C.

May 21-23—American Supply & Machinery Mfrs. Association, Triple Industrial Supply Convention, Atlantic City, N.J. Association Headquarters—2130 Keith Bldg., Cleveland 15, Ohio.

May 23-26—Machinery Dealers National Association, Annual Convention, Sheraton-Blackstone Hotel, Chicago, Ill. Association Headquarters—1346 Connecticut Ave., N.W. Washington 6, D.C.

May 24-25—The Wire Association, Mid-West Regional Meeting, Hotel Muehlebach, Kansas City, Mo. Association Headquarters—453 Main St., Stamford, Conn.

May 24-26—Marking Device Association, District 8 Meeting, Palace Hotel, San Francisco, Calif. Association Headquarters—912 Chicago Ave., Evanston, Ill.

May 28-30—National Fluid Power Association, Spring Meeting, The Greenbrier, White Sulphur Springs, W. Va. Association Headquarters—1618 Orrington Ave., Evanston, Ill.

May 29—Cutting Tool Mfg. Assoc., Quarterly Meeting, Lochmoor Country Club, Detroit, Mich. Assoc. headquarters—416 Penobscot Bldg., Detroit 26, Mich.

June 3-6—American Gear Mfrs. Association, 40th Annual Meeting, The Homestead, Hot Springs, Va. Association Headquarters—1 Thomas Circle, Washington 5, D.C.

June 7-10—National Metal Trades Assn. Western Plant Management Conference, Dell View Hotel, Lake Delton, Wis. Association Headquarters—337 W. Madison St., Chicago 6, Ill.

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QUICK-CHANGE
Tool-Holders to Drill, Tap and Set Studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tap-holder, if required.

POSITIVE
For through holes where work is drilled and then re-handled and tapped.

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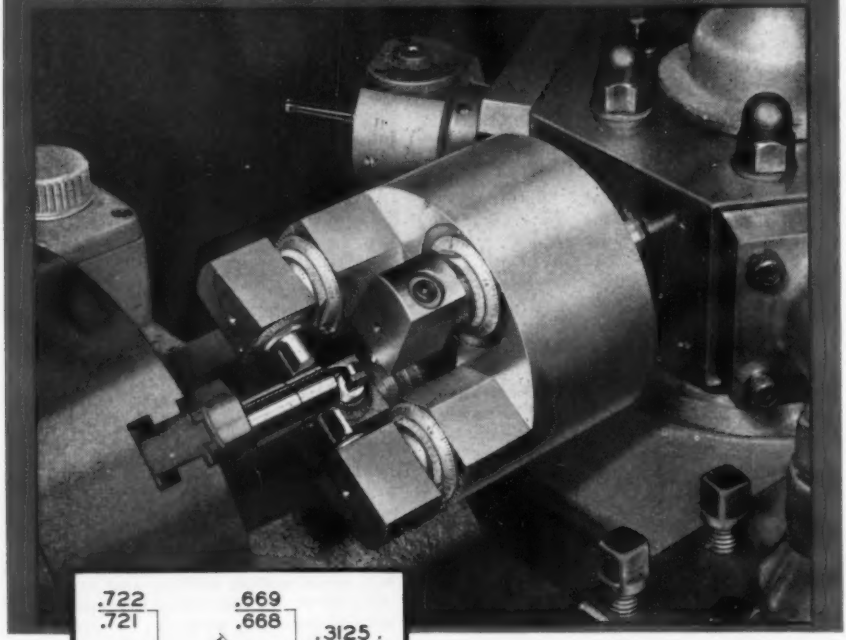

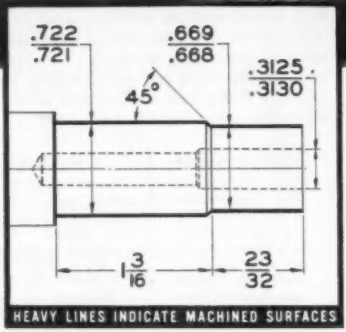

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Rates of feed on turning operations were increased 100% by incorporating Box Turning Tool with multiple Microbore units.

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Each tool is adjusted independently by micrometer vernier principle for radial and linear settings which provide accurate and rapid settings of tools for shoulder dimensions and turned diameters.

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LEADERS OF THOUGHT IN INDUSTRY

MACHINE AND TOOL
blue book

Dr. Haldon A. Leedy

An Interview with Dr. Haldon A. Leedy, Vice President and Director, Armour Research Foundation

Dr. Haldon A. Leedy, vice-president and director of Armour Research Foundation, the nation's second largest independent industrial research organization, is responsible for the operation of research programs totaling $12,000,000 annually. He directs the activities of nearly 1200 persons, more than half of whom are engineers and scientists.

A native of Fremont, Ohio, Dr. Leedy was born on April 15, 1910. He received his bachelor of arts degree in physics in 1933 from North Central College, Naperville, Ill., and was awarded the master of arts and doctor of philosophy degrees from the University of Illinois in 1935 and 1938, respectively.

Dr. Leedy joined Armour Research Foundation as a physicist in 1938 after completing work toward his doctorate. In 1944, he was advanced to the chairmanship of the physics department, assuming the Foundation directorship two years later. He was named vice-president in 1950.

Dr. Leedy has written numerous papers and articles on acoustics, vibration, and noise abatement, in addition to articles on the role of industrial research organizations.

Q. Dr. Leedy, what is the Armour Research Foundation?

A. The Armour Research Foundation is an independent, not for profit organization affiliated with Illinois Institute of Technology, set up to carry on a research service for industry and for government. We conduct the research on a confidential basis for industrial sponsors, operating essentially as a part of their own research laboratory. We have a wide diversity of operations in various fields of science and engineering and are able to tackle a wide variety of industrial problems.

Q. Do you, as an organization, originate research or are you called upon to handle specific projects from industrial firms?

A. Almost all the projects that we carry on are sponsored by industry or government. We have no endowment at Armour Research Foundation and, hence, have no funds to carry on research of our own -

continued

except what little money we may have left over from our sponsored programs. This past year we carried on over 500 different projects; about two thirds of which were for industrial concerns and about one third for government agencies. Our total volume of business this last year was a little over 11 million dollars. We do carry on a certain amount of work that we sponsor ourselves. The total expenditure each year for such is about $150,000. Sometimes these programs are very fundamental, such as extending Einstein's theory of relativity, or they may be along rather practical lines such as trying to make a television set which hangs like a picture on the wall, thereby not taking up so much space in a room. The studies we carry on with our own funds are mainly those that our people originate.

Q. As they go along on various projects they get ideas for further research on their own?

A. Most of these projects develop into sponsored projects for industry. In a few cases we carry on the research with our own funds to a stage where we can obtain patents. For example, almost 20 years ago one of our young employees, Marvin Camras, developed a new type of magnetic wire recorder, and from that early work he developed tape recording. This tape recorder that we are using to record this interview is one of those which is manufactured by a company licensed under our patents.

Q. What is the scope of the Foundation's work?

A. Well, the Foundation is a sizeable research organization. We have some 1150 employees, two thirds of whom are technical and professional people, and we cover practically all the fields of engineering and the physical sciences, such as physics, chemistry, chemical engineering, electrical engineering, mechanical engineering, fluid mechanics, propulsion, metallurgy and ceramics. We also have a small group in engineering economics and another group called our international department which carries on studies outside the country.

I might add, this diversity of operation is one of the great strengths of an organization like ours. As you can well imagine, most research problems today are fairly complex. They usually don't come under a single scientific discipline such as chemistry, and a chemist may need, for example, the help of a metallurgist or an electrical engineer. We can put a group of scientists on the solution of a project selected entirely from our own staff, and this team approach is very important today in solving industry's complex problems.

Q. *Along the lines of the economic research that you have conducted have you been called upon by industrial firms to develop things such as economics of machinery replacement and life of machine tools?*

A. We have performed a limited amount of that work. Some of our work in the engineering economics area is first of all to determine whether it's economically desirable or feasible to spend say $25,000 on the solution of a problem, and to determine in advance, insofar as possible, whether or not the company can make a profit which will justify such an expenditure. Naturally, it is not a good idea to undertake a program for $25,000 and eventually realize a profit of only $10,000. In this field of engineering economics we get into other studies. A highly specialized motor, for example, has been developed by a company in Chicago, and this company may be interested in a possible market for such a motor. To perform such a study intelligently, one has to have a technical knowledge of the motor and its technical applications as well as people who can make an economic study of where this motor can be used—what costs will be saved by using this motor. So a combination of people trained in both economics and engineering is very important for such a study.

Q. *Some small and medium sized industrial firms seem to think that research is for big companies only. I believe you have brought out that the cost is of such a nature that maybe they can't afford it, but do you have any further comments on that?*

A. Well, I think the facts will indicate that many of the small companies do not have research laboratories. And it is probably because the cost of a scientist or engineer for a year, including services that he needs, runs, on the average, about $22,000 a year. Unless a company can afford to spend that amount of money, it cannot set up even a one-man research laboratory. So for the smaller companies, an expenditure of this magnitude may be out of the question. Small companies often carry on research through trade associations. Groups of them get together and jointly sponsor a research program, or may do it in their own trade association laboratory for the benefit of the whole industry. But most of the research in this country is done by the larger research organizations. Another difficulty for small companies is that research equipment today is very expensive. Right now we are building a nuclear reactor which will cost around $700,000 and even some of the larger companies cannot afford that sort of expenditure for one item of equipment.

Q. *Do you have any thoughts regarding the better utilization of the nation's scientific brains and talent?*

A. That, I think, is a most challeng-

continued

ing question. As you probably know, we have been expanding our research activities in this country at a very rapid rate. We are spending money today, including government research expenditures, at a rate of 5 billion dollars a year. This is more than has ever been expended in any previous year. As a matter of fact, if you add up all the expenditures for research during the last 20 years, that total expenditure is over seven times the total amount of money spent for research in the United States prior to 1936. The 5 billion dollars that we are spending this year, even when we take out the inflation factor, is 12 times as much as we were spending 20 years ago. So we are spending money at a much greater rate. One might say, "We can continue to increase our research output simply by spending more money." But the catch is we don't have the professional personnel today to carry on an expanded research program. It is my feeling that if we are to continue to expand our research activities we must improve the efficiency of our research operations. With the rapid expansion of research, I don't think enough attention has been given to the efficiency of our research operations.

Q. ***We would be interested in knowing about some of your current work and about any trends which you can see developing in research.***

A. Well, our range of activities is so wide that it would be difficult in a short time to begin to cover all of them. In our physics department, for example, we are doing work in the field of acoustics, assisting industry in its noise reduction problems. Industry is interested in seeing that its home appliances operate more quietly, and we are doing work for several companies in that area. In the field of physics of solids, we are developing improved transistors, and, in the electronic field utilizing transistors for miniaturization of electronic equipment. In the field of metallurgy, we are doing work on titanium, developing alloys that will withstand higher temperatures. Jet airplanes are flying at higher and higher speeds, and one of the problems is that the skin of the airplane begins to get very hot at high speeds. You must have metals which will withstand these high temperatures, and titanium possesses certain characteristics which enable us to make good high-temperature alloys.

I could go on from field to field. Our annual report summarizes some three hundred different programs

that we have carried on during the year, which gives you some idea of the scope of our operations.

Q. I would like to ask one final question, Dr. Leedy, about Russian research. How much do we know about Russian progress nowadays, and about their approaches? Do you think we can improve on our methods or our approaches to research on the basis of what we know about theirs?

A. I think our people in government know a lot about what Russia is doing in research. Naturally, this information must be held confidential too and can't be circulated widely. But I do feel that we are continuing, in most areas, to keep ahead of the Russians, although we can't underestimate their abilities. They are devoting every effort to training engineers, and I think if mere numbers means anything, they are advancing today a little faster in the engineering field than we are. My own personal feeling is that it takes more than just mere numbers to get high output. As an illustration, I would like to point out that although we have only 6% of the world's population, yet we produce 40% of the world's total goods. If we have the same comparable efficiency in our research, I don't think we have anything to fear.

Q. Where can we strengthen our research programs?

A. One of the most important and dynamic developments of the last half century has been the growth of organized scientific research. It has been responsible, to a larger degree than any other single force I know, for this nation's healthy economy, its high standard of living, and its position as a world power. However, if the United States is to continue progress at its present rate, increased attention will have to be devoted to basic research. Much of the applied research today, as a matter of fact all of the applied research, depends on knowledge obtained through basic research, and much of our knowledge of basic research still comes from developments made earlier in Germany, England, and other parts of the world. They have spent more money and time on fundamental research proportionately than we are spending. I think that we must continue to build up our stockpile of fundamental knowledge, delve into the fundamental laws of nature, find out more about magnetism, more about electricity, more about nuclear energy, more about the composition of the atom, and obtain more fundamental knowledge which constitutes the building blocks for our applied research programs. If there is one outstanding weakness which I think exists in our over-all research program it is the little effort that we are devoting to, or the small amount of money that we are spending on fundamental research. • • •

LETTERS TO THE EDITOR

MACHINE AND TOOL
blue book

Likes Directory . . . It (Hitchcock's Machine & Tool Directory) seems to be compact and inclusive enough to serve as a useful tool in many cases.

The only recommendation I would make would be to add another classification of mild and tool steels, either in alphabetical order of trade name, or in grouping all similar steels together, such as all 0-1 or all D-2, with source.

Sometimes in die repair, or working from out-of-state prints, we run into new tool steel grades which must be identified.

H. H. Weinberg, Buyer
Advance Tool, Stamping & Die Corp.

We received a copy of the 1956 edition of Hitchcock's Machine & Tool Directory, and we thank you. We have found it a good reference and buyer's guide.

If information regarding physical and chemical content of grades of production steel could be included, it would be of great help to us, and I am sure to other similar manufacturers.

L. Q. Hines
The Ferguson Mfg. Co., Inc.

We have received your 1956 edition of the Directory. Hardly a day goes by that we don't use it and sometimes very extensively.

You should be congratulated on the best edition in a long series.

A. K. Rollins, Buying Supervisor
The Maytag Co.

Thanks for suggestions. The tool steel section in the 1957 Directory will be greatly expanded.

Engineering For You and Me

I enjoyed reading your article. It certainly simplifies the fundamentals of strain and stress. I forwarded your article to our Assistant Chief Engineer, and his remarks were: "This is a good article on fundamental strength of materials. I'll be looking forward to the next installment."

I will also be looking forward to the next installment. If you have extra copies of the article, I would appreciate your sending me ten.

Joseph E. Markvart, Supt.
Gisholt Machine Co.

We would appreciate three copies of Harry Conn's series, "Engineering For You and Me." We refer to Parts 1 and 2 already published and really would like to obtain the whole series in reprint form.

You ask for reader reaction—we recently had the opportunity to hear Mr. Conn speak on shop work and believe he delivered more good information in the form of "Common Horsesense" than we have heard in a long time. His writings in this series follow the same good pattern.

C. G. Aldrich
C. G. Aldrich Mfg. Co.

We wish to thank you for the fine article written by Mr. Harry Conn, Chief Eng., Scully-Jones Co.

We would be more than interested in having more of this type of simplified engineering, written about Stress and Strain, and other branches of engineering.

W. R. Hagan
John J. Foster Mfg. Co.

Powder Metallurgy

We are very interested in distributing copies of the article on powder metallurgy which appear in the last two issues of your publication. (Feb. and March.) This article, by Bradbury and Karion of the Stokes Company is a most complete and excellent summation of the present situation on powder metallurgy and if it is available in reprint form we would be very happy to have ten copies.

A. L. Trumpler
Harper Electric Furnace Corp.

Congratulations

A few years back you visited our plant and the writer had a very interesting discussion with you regarding various types of training methods then in use, and what the future would require in that line.

We have continued to use the MACHINE and TOOL BLUE BOOK in acquainting our trainees with what goes on within our industry today.

The purpose of this letter is to compliment you on the editorials that appear over your name. They present some fine thinking for our future young Mr. America's consideration, as well as for us adults.

You are a busy man, so this letter does not require acknowledgement. We merely wanted to offer commendation for a job well done. The pen is indeed a mighty weapon!

Warren L. Thompson,
Supt. of Training
Jones & Lamson Machine Co.

Information, Please

As reader of the BLUE BOOK I have been interested in your "Yours very truly" series. Therefore thought I would avail myself of the opportunity to secure some expert information on the following problem.

I am trying to find just the right type of glue to use in refinishing used polishing wheels. This glue would be used over used emery cloth and would hold the new emery. It would have to be flexible but strong, also heat resistant. Is there such a product on the market and if so where obtainable in quantities?

Herbert T. Rice
Rice Machine Products

Any help you can offer Mr. Rice would be greatly appreciated.

I am interested in obtaining literature on the superintending of a machine shop which employs about seventy five men. . . .

Charles R. Saporiti

We suggested Mr. Saporiti write to the Foreman Institute, Deep River, Conn. for this information.

• • •

Do you really know the alloys you buy?

For instance, are you SURE of:

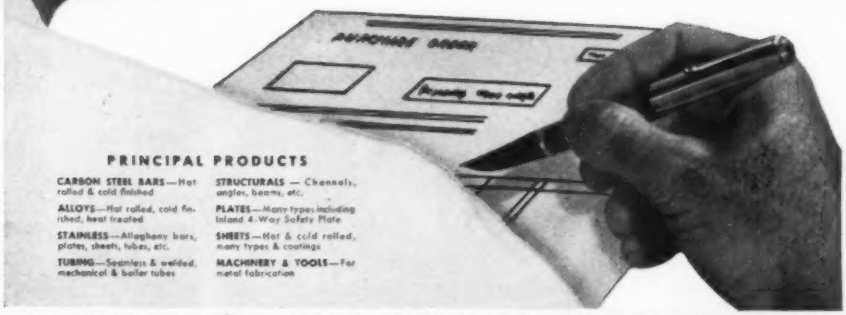
- **Heat identification** . . . not just type identification but the positive identification of your particular heat so you can be sure the alloy steel is everything it is supposed to be?
- **Chemical analysis** . . . not just the chemical range for the type, but the specific analysis of the heat from which your steel was rolled?
- **Hardenability** . . . not just the average hardenability for the type of alloy, but the actual test-proved hardenability of your particular heat of steel?

If you don't know these important facts, you may be in for trouble—loss of time and money; breakdown of equipment. It can happen when you're not sure of your alloys.

But when you work with Ryerson alloys you *can* be sure—sure of the steel you get, sure of what it will do—because Ryerson alloys are certified by an 8-step quality control program.

Every step has a specific purpose—every step is designed for your protection, but doesn't cost you a dime. For alloys with all questions answered, call your nearby Ryerson plant.

RYERSON STEEL



PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished
ALLOYS—Hot rolled, cold finished, heat treated
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
TUBING—Seamless & welded, mechanical & boiler tubes
STRUCTURALS — Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot & cold rolled, many types & coatings
MACHINERY & TOOLS—For metal fabrication

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Circle No. 291 on Card, Opposite Page 65

MACHINE AND TOOL
blue book
MAY—1956

At Detroit Transmission, as in other GM divisions, the process engineer is held responsible for success of new machining programs. Here process engineer Ed Zilz, left, talks over the new pressure regulator plug with general foreman J. Linden in the automatic bar machine department at the Willow Run plant.

new part . . . new process cuts

Production Cost

for G-M's Detroit Transmission Div.

By **Jack Kenyon***

**Mr. Kenyon is Associate Editor of* GRINDING *and* FINISHING *magazine, sister publication to* BLUE BOOK. *While on assignment for G and F at Detroit Transmission he saw the following story, thinking* BLUE BOOK *readers might be interested in it.*

● The finishing touches are being put on the retooling job at the vast Willow Run plant of GM's Detroit Transmission Division. The plant makes the new Hydra-Matic transmission for Cadillac, Oldsmobile, and Pontiac, as well as Hydra-Matic transmissions for other makes

continued

of cars and for GMC trucks and busses. This is the first major retooling of any automatic transmission plant in the industry. Planning for the job began almost three years ago, just after the monumental task of restoring Hydra-Matic production following the division's disastrous Livonia fire. Restoration of production at Willow Run was done in the fantastically short time of twelve weeks after the Livonia disaster. The retooling installation program just now being completed has taken something less than six months, during which time continuous production has been maintained.

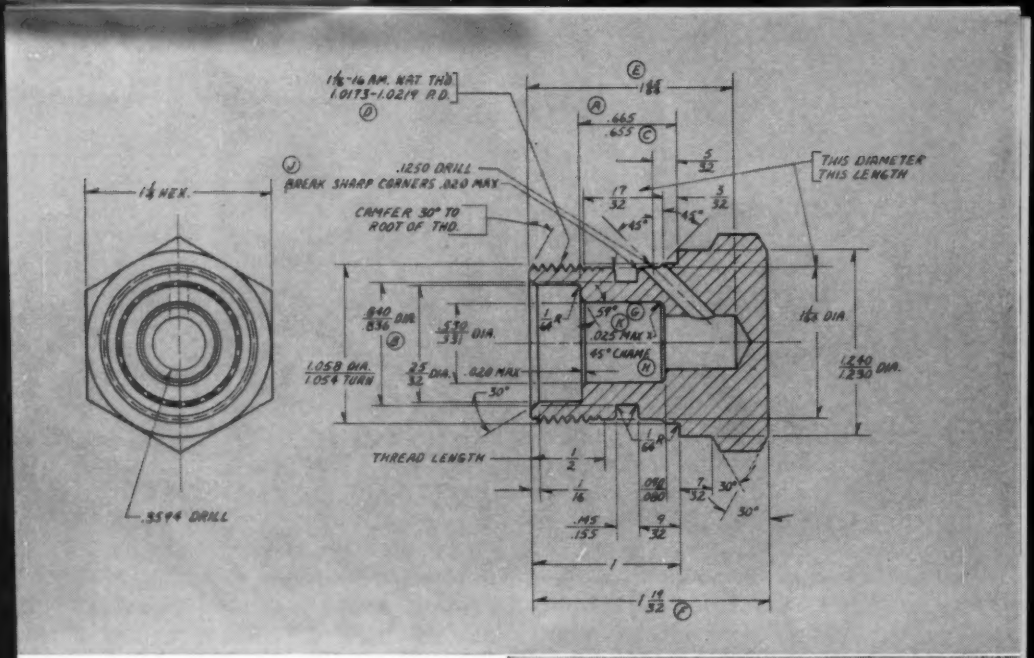
The plant's new tooling contains many examples of transfer-type equipment, and of course these aspects attract a lot of attention. But there are plenty of other jobs which, while they may not be quite as dramatic, represent advances in productivity and in lowered cost of operation.

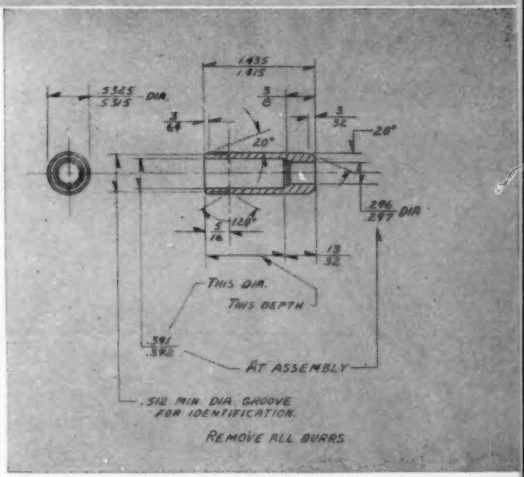
For the new transmission, most parts have been redesigned and all have been retooled. Typical of those which have been both redesigned and retooled is a small part known as the pressure regulator plug, which fulfills a regulatory function in the control section of the transmission. This part in the older model Hydra-Matic was an assembly consisting of a plug and a sleeve which was press-fitted into place. You can see that by eliminating the sleeve in the new design, engineers have automatically helped the production men reduce costs.

In the old design, the first operations on the plug—form, drill, counterbore, thread, ream, chamfer and cutoff—are performed as a single operation, starting from 1-1/4 hex SAE 1113 stock, on an Acme automatic. Then the part has the 1/8 inch hole drilled on a drill press. Removal of the drill burr is done by hand, using a model 200 U.S. reamer. A dimensional inspection follows.

For the sleeve, to be pressed later into the plug, the first operations are also performed on an Acme automatic—form, chamfer, drill, groove, ream, and cutoff—starting with 9/16 diameter SAE 1113 cold-drawn steel bar stock. Following the automatic operation, the part O.D. is ground to .5320″-.5315″ on a Cincinnati centerless grinder for press fit into the plug. Inspection for the following tolerances then takes place: Taper and runout of OD, .0003″ .

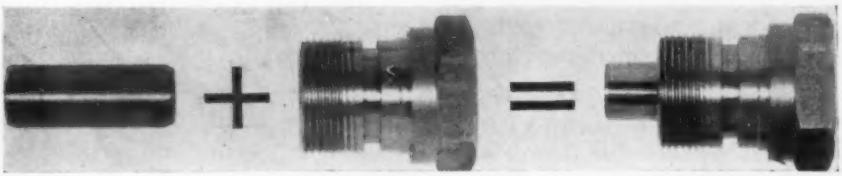
Assembly of the two components is done on a Greenerd arbor press. The exposed end of the sleeve is then faced and chamfered so that over-all part length will be within tolerances. The .0937″ radial hole is then drilled through both parts of the assembly on a Delta drill press. This leaves a burr which must be removed in subsequent

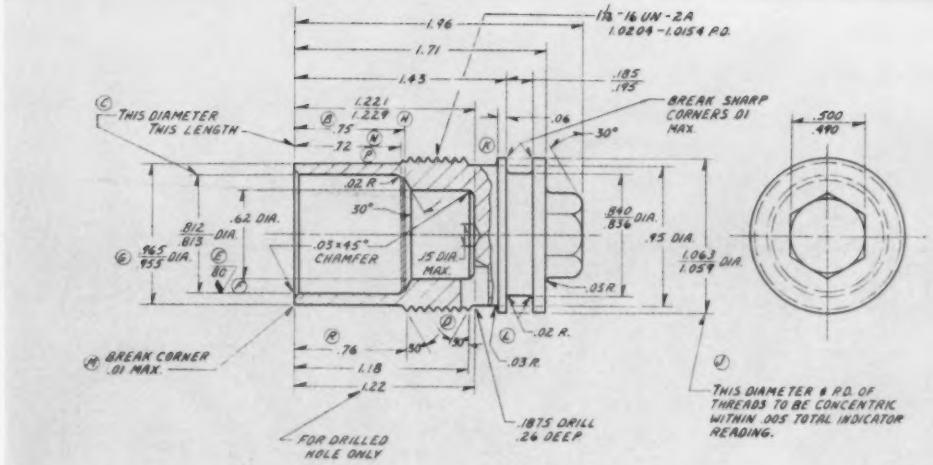


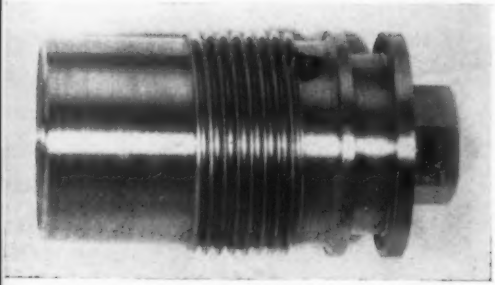


Above is shown a drawing of the sleeve and on the right a drawing of the plug. Combined they formed the pressure regulator plug.

Below are photos of the sleeve, the plug and the final assembled regulator plug.







Pressure regulator plug is redesigned for GM's new transmission, fulfilling a similar function as old part, is made in one piece as compared with plug-and-sleeve assembly of former model. This has cut down number of machining operations, inspections, and has eliminated assembly operation.

Detroit Transmission

continued

operations. Both ID's are finished reamed—the .391"-.392" ID on a 3-BM Fosdick machine, and the .296"-.297" ID on Kingsbury special equipment. The parts are then washed and blown out with 100 pound air before final inspection.

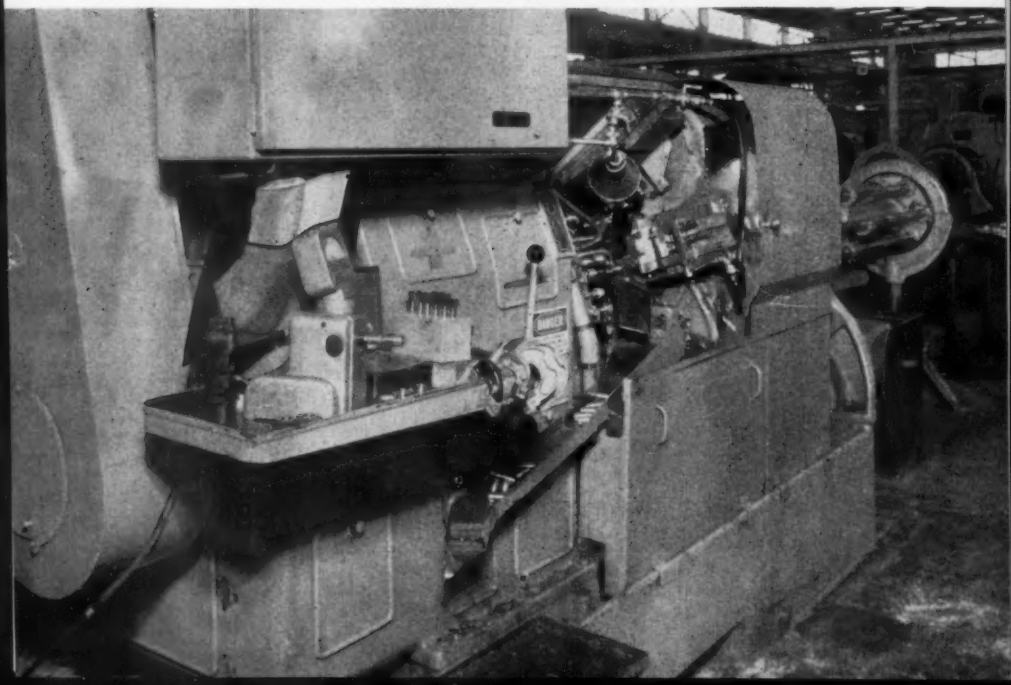
Contrast of the new part and the methods by which it is made is remarkable, when compared with the old part. The new part, redesigned for the new transmission, gives better performance than the old plug assembly. Part quality resulting from the new methods is better, and the economies of the new methods will be apparent. Instead of 10 operations (including assembly and washing) plus five inspections on

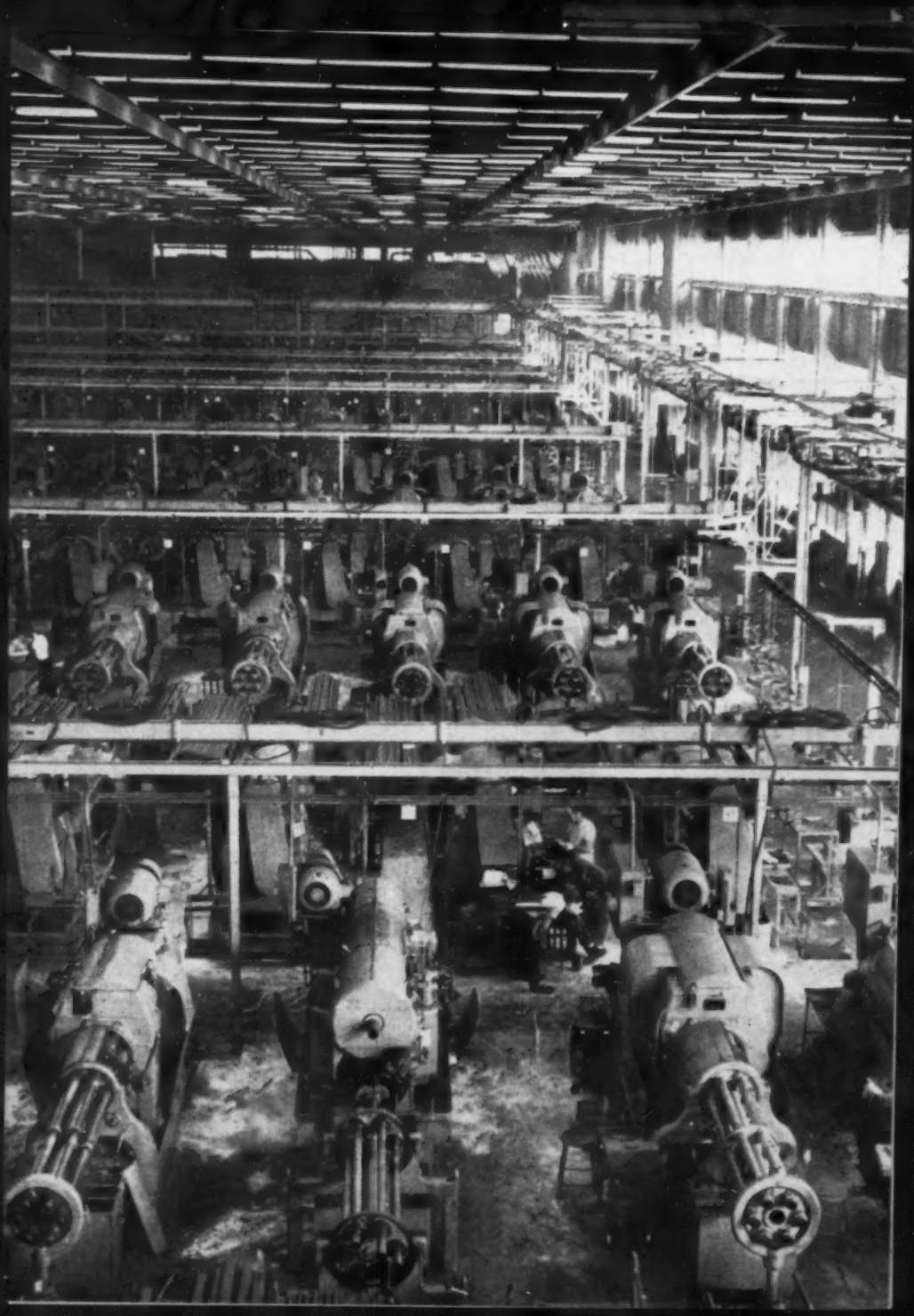
the old part, the redesigned part is made in just five operations including washing, and only two inspections are necessary. Manual aspects of the operations have been reduced markedly, reducing worker fatigue on the jobs.

The new part starts out as 1-1/8 inch round SAE 1113 cold-drawn bar stock, instead of the hex stock formerly used. First operation on the part is combined form, drill, ream, shave, breakdown, and cutoff on a 1-5/8 RB6 Acme. This accomplishes the major contouring of the part, leaving only the formation of the hex head (used for assembly), drilling of the .1875 radial hole, and forming of the threads for subsequent operations. Immediately after the automatic operation, the parts are washed and subjected to sampling-type inspection. Washing is done by an International Washer.

Next operation on the plug is broaching of the hex head, done on a special Detroit broach which features a cam indexing fixture and a drilling attachment for drilling the radial hole. The machine broaches two sides of the hex simultaneously on the downstroke, and the indexing fixture rotates the part for the next two strokes necessary to produce the hex. Drilling of the .1875 hole is done simultaneously with the broaching operation by an Ex-Cell-O drilling attachment.

Most machining on new plug is accomplished in first operation, on Acme automatic.

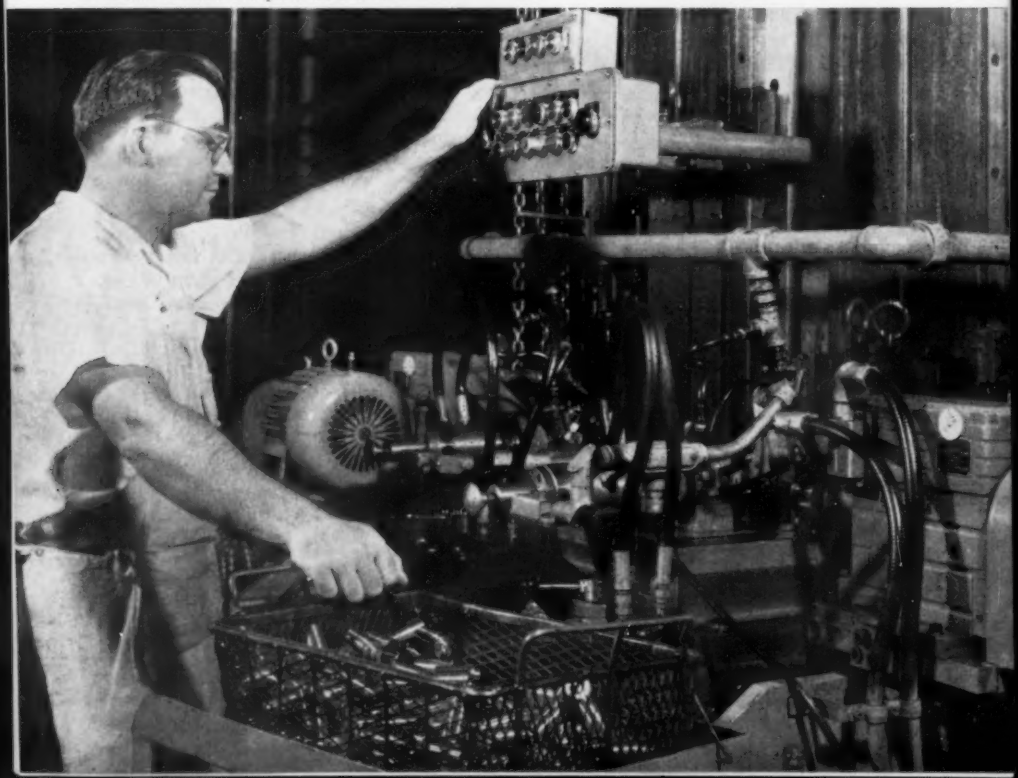




The third operation on the new part is rolling the 1-1/16 UN-2A thread on a Reed thread roller. Rolling has been found to give an excellent finish on the threads without producing the burr found on similar screw-machine produced parts. It is necessary to burr the part ID at this point, to

Opposite: Detroit Transmission's automatics range in size from ⅛" Brown & Sharpes to 7¾" Acmes. This department's 204 machines are linked by continuous conveyors which provide smooth parts handling.

Top Right: Chip disposal system under operating floor serves all machines of automatic department. Reduces housekeeping problems to a minimum.
Bottom: Following automatic operation and inspection, regulator plugs have hex heads broached and radial holes drilled in combination operation on this Detroit broach with Ex-Cell-O drilling attachments. Machine handles two parts at a time.



Final machining on redesigned plug takes place on Reed thread roller, behind operator, and Cincinnati speed lathe in foreground, which cleans out drill burrs from radial hole. Machines of this secondary operations department, grouped for best parts flow, are connected by conveyors. Washing and inspection follow these operations.

clean out drill burrs resulting from drilling of the radial hole. This is done on a Cincinnati speed lathe, using a burr reamer. It is possible for one operator to perform both operations.

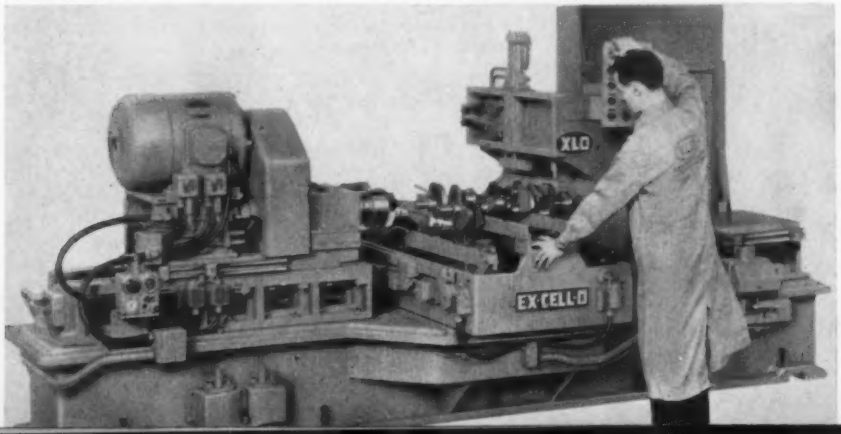
Thorough washing of the parts is necessary. After washing, which is done in a conveyorized international washer, the part is given 100% inspection. • • •

Faster Crankshaft Machining

Performing triple operations simultaneously on two crankshafts, a special Ex-Cell-O machine is reducing production costs for an automotive manufacturer. Loaded and unloaded automatically, it receives and discharges workpieces by conveyors.

Operations on the crankshafts include finish boring a diameter within limits of plus or minus .0005" and holding the bore concentric with the main bearings, facing a surface square with the main bearings, and chamfering an edge.

Two standard hydraulic slides are mounted on a base with a fixture between them. At the beginning of each successive machine cycle, two crankshafts have been completed in the machining station while a second pair are in "ready" position. In motion, transfer bars move the finished crankshafts to an unloading device, while the others are brought into machining position. Hydraulic chucks grip the latter two crankshafts and rotation of them begins. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.



Photos courtesy ROTOR TOOL CO., CLEVELAND

Previous method ran the tool at 3600 rpm. With a change to 8500 rpm production time was cut in half.

How to cut costs in use of portable pneumatic tools

- ✓ *analyze your permanent installation*
- ✓ *get the best tool for each application*
- ✓ *maintain your equipment carefully*

By **Hermann Reichardt**
Consulting Engineer

● More efficient use of your portable pneumatic tools can mean dollars in your pocket. Most plants use pneumatic tools of one kind or

continued

Having a wide range of sizes of portable pneumatic tools doesn't mean going overboard and causing a maintenance problem

another—recent studies show that nearly 72% of all metalworking shops use them in various applications. Potential users are even more numerous; compressed air is available in about 82% of the nation's metalworking plants.

If you are to gain maximum efficiency from these versatile tools which offer high power at low weight, good torque characteristics and low cost of operation, you should see if your installation is up to date and adequate. Take time to analyze your entire pneumatic tool operations—from compressor, through lines, to individual tools—to see where operating costs can be cut.

There are three main areas where you can economize. First is in your permanent installation—the compressor, receiver, air lines and system accessories. Have they been planned adequately to meet your present and future demands? Small gains in efficiency here will mean big gains in operating economy. More about this later.

Second place you can look for savings is in tool application. Are you using the right portable tool for the job, or can it be done faster with a lighter, easier-to-handle tool? Are you aware of new trends in portable tool use?

Last, and perhaps as important as the first two questions—Is your portable tool maintenance adequate? Pneumatic tools today are remarkably reliable and easy to maintain, but are you giving yours the necessary care?

First consideration should be the adequacy of the permanent part of your installation. And this doesn't mean a cursory glance at the compressor output pressure gage; that's only the beginning of the story of air in your plant. How much air is actually being delivered to the individual tools is the important thing, and the cleanliness of that supply enters in too. Pressure checks should be taken at the tool by means of a hypodermic-needle type gage, while the tool is actually operating, to give a true picture. The hypodermic gage is inserted into the air hose near the tool, and the reading obtained will be a good indication of how well the tool can be expected to perform.

The most frequent source of pressure loss between compressor and tool is undersized mains, down-

5407

HAMILTON Varimatic®

SUPER SENSITIVE
VARIABLE SPEED • SMALL HOLE
PRECISION

drilling machine

SINGLE OR MULTIPLE SPINDLES

to drill holes (.004" to 5/16") in all drillable materials, to the most exacting specifications and on the most relentless production schedules.

Get prices and specifications without obligation.

ASK FOR **FREE** BULLETIN 5407

Address The Hamilton Tool Company
826 South Ninth Street
Hamilton, Ohio

IT'S A **Hamilton Tool**
USE IT WITH CONFIDENCE

Circle No. 292 on Card, Opposite Page 65

You can cut costs by getting the right tool for the right job.

pipes, and hose. Compressor and air-tool manufacturers all have complete tables to tell you how large these lines should be to deliver proper pressure to the tools. It's better to be generous in applying the recommended sizes, since pipes tend to restrict themselves in use.

Your system should have after coolers to eliminate moisture condensation from the air lines which causes corrosion in air tools. After coolers will also cut down accumulation of restricting particles in air lines.

Air leaks are a bigger factor than most people realize. According to the Compressed Air Handbook, the presence of a leak as small

How to Cut Costs

continued

as 1/16-in. in diameter will mean the loss of 182, 272 cu. ft. of air per month, at an average cost of $10.94. Attention to leak detection should, therefore, have an important place in the maintenance program.

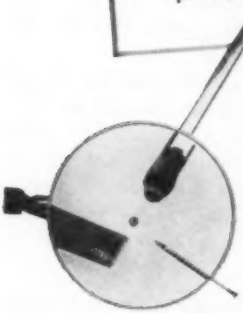
Most compressor engineers tend to recommend compressors on the generous side of the required capacity. You needn't shy away from such recommendations, because you'll benefit from lower cost per cubic foot of air delivered from a larger compressor. The smaller compressor is inherently less efficient, and if you anticipate the enlargement of compressed air uses around the plant, the larger model is probably the answer for you.

Getting the right tool for each job in the plant is an important item in portable pneumatic tool use. It's good to have a big range of sizes and capacities available for the various applications in the shop, without going overboard and getting too many for convenient maintenance. Many shops are standardizing on one manufacturer's tools and thus getting the benefit of dealing with one servicing company. Most of the large suppliers of pneumatic tools have a sufficient size range in their lines to make this practical. You'll cut down on the number of spare parts you have to keep on hand with this policy, if your shop does most of its servicing and parts replacement.

PRECISION GEARS

YOU who use small gears, (to 6" O.D. of the gear blank) can improve the performance of your product, through increased gear precision, without sacrifice of gear production.

YOU who use small, fine pitch, precision gears can increase your gear production without sacrifice of gear accuracy, or improve your gear accuracy without sacrifice of gear production.



The Hamilton Precision Gear Hobber, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle runout to less than .0002", workspindle and tailstock spindle alignment to less than .0002", and this workmanship is maintained throughout the machine.

WANT FACTS?

Write for Bulletin No. 5419.
Address The Hamilton Tool Company
826 South Ninth Street,
Hamilton, Ohio

IT'S A **Hamilton Tool**

USE IT WITH CONFIDENCE

Circle No. 293 on Card, Opposite Page 65

continued

Often the manufacturer's representative will be able to recommend a smaller, lighter tool to replace a more unwieldy heavy tool and at the same time give better results. In one case a foundry was using a grinder usually operated with 6-in. wheels at 6000 rpm, to do a job of internal casting cleaning. A 3-in. vitrified cone wheel had been substituted for the 6-in. wheel, and satisfactory results weren't being obtained. Wheel loss was excessive and metal removal was slow. A change to an 8500 rpm machine gave better performance and at the same time reduced the weight from 11-1/2 pounds to 9 pounds. Operating at the correct surface speed, the grinder gave 50% longer wheel life and substantially increased metal removal rate for the operation.

In high-production operations of many kinds, multiple-spindle pneumatic tools are finding widespread use. They have been extensively applied in assembly work, particularly as nut runners and tighteners in automotive plants. You should be alert to take advantage of this type of application if it fits your operations.

A careful program of maintenance must be followed. Regular inspection of the compressor and its accessories and connecting lines is vital to economical operation.

Most important place to concentrate on maintenance is in the individual tools. Frequent and regular lubrication is the most important single procedure. An improperly lubricated tool will work with reduced power and will eventually score. A few drops of light pneumatic tool oil should be injected into the intake bushing every time the tool is connected to a hose, and at the same time several drops should be squirted into the live handle. Where air line lubricators are used, make sure that the right lubricating oil is injected periodically. If the tools have built-in reservoirs, fill them at the beginning of each shift or oftener. If bearings are equipped for pressure lubrication, they should be greased every day.

Air strainers should be kept clean and no tools should be operated without them. They can generally be cleaned by blowing air through them in the reverse direction. Never punch holes in them, since this defeats the purpose of the strainer.

Pneumatic hammers should never be operated with a loose handle, since this will in time damage the cylinder or the threads. If safety rivet set spring clips are used, remove them by hand or by special tongs—not by striking them with another object.

If no one in your plant has been designated as the responsible party for maintenance of air tools, by all means take that forward step. • • •

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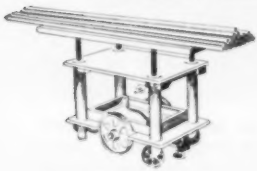

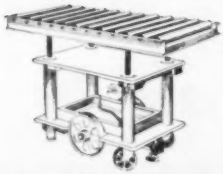

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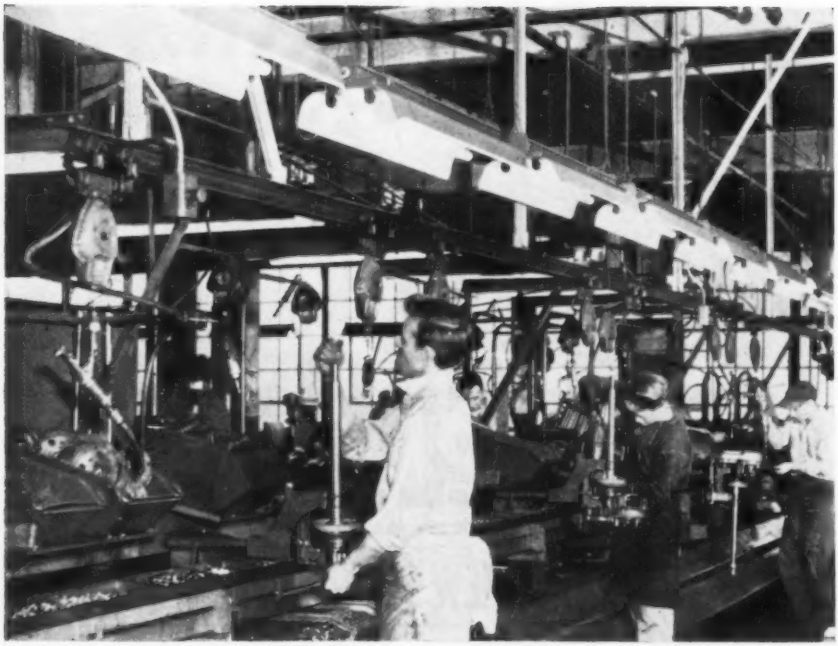


Two-year old gear assembly line at Blackstone Corp., utilizing air power to operate over a dozen tools for bolt, nut and screw running, as well as air presses for precision fitting. Conveyor (Seen turning under, left) mounts adjustable fixture for holding gear case assembly in various positions as it moves to right.

Air power speeds gear case assembly

- ✓ tools require less maintenance
- ✓ increases output 75%
- ✓ reduces noise
- ✓ efficient power source

Advantages of Compressed Air

SPECIAL TO MACHINE AND TOOL BLUE BOOK

● Methods men at Blackstone Corp., Jamestown, N.Y., two years ago set up a conveyorized, table-height, gear case assembly line to provide gear case units for automatic washers. Careful study point-

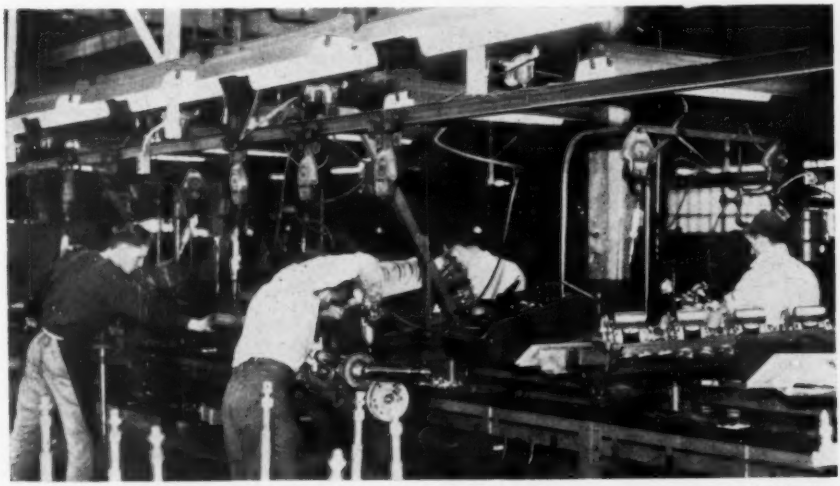
ed to the use of compressed air as the most efficient power source for a number of bolts, nut and screw running tools, as well as for light, precise press fits and similar assembly jobs.

A number of other factors were given special consideration to keep this line flowing smoothly. Air distribution problems included correct piping to give air tools maximum operating speed and power, and oiling and filtering units for each air tool or press. Work stations along the 50-foot line are located so that men on one side of the conveyor supply sub-assemblies of the gear case to men on the other side who complete the job. Eight or more workers are on the line, although this number can be varied to suit production requirements.

Even tote pans and trays carrying a great variety of parts are tipped toward the individual workers, and pan sides are sloped to make access to parts easier. Slightly inclined sheet metal troughs help move sub-assemblies or parts to workers. Air tools themselves, weight varying from two pounds on up to six or so, are counter-balanced from reels at work stations, so they can be within arm's reach.

These air tools receive air through rubber hose, and the counter-balancing reels hang from wheels riding a monorail system, so that the tools can be moved several feet up or down the assembly line; giving the worker flexibility in timing for different assembly operations.

Tracing air distribution from the connection to the air tool back-



Here monorail that suspends counter-balancing reels for air tools is seen; some of air distribution is visible.

continued

". . . manual operation would cut back production about 75%."

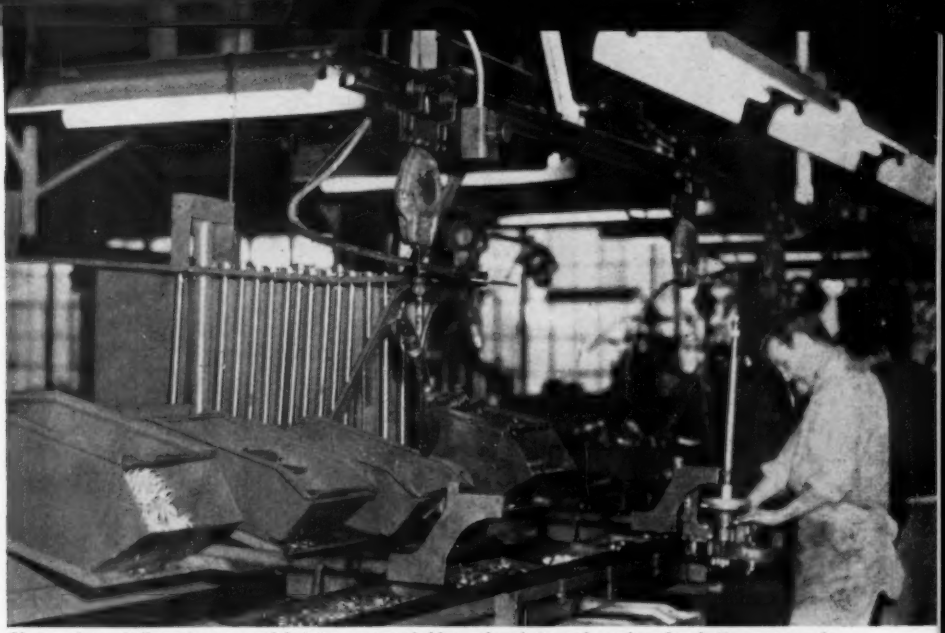
wards, the rubber hoses run several feet and are coupled to one-inch pipe which in turn leads to filters and oilers. Two or more air tools operate from one set of an oiler and a filter, depending upon how often the tools are used and what each does. Tool sizes are also considered in deciding the number to be coupled to a set of oiler-filter units.

This sub-assembly is at a nearby table, but again air power does the job, assembling fingers, case and plate in hatchet disc, pressing in two pins, finishing units, foreground. Again details of air line connections (gate valve, air filter, regulatory pressure valve, oiler) for press are shown.

Filters, of course, are important to keeping the air tools free of moisture and fine dirt, while the oiler, usually holding only a half pint or so of oil, impart a fine mist of lubricant to the air stream to aid operation of tool blades and spindles that would otherwise "freeze" during continued operation.

One-inch air lines leading to filter-oiler installations run ceiling-ward to a two-inch, main air distribution line running the length of the gear assembly line. It was pointed out that the use of smaller air lines to individual tools would provide the same pressure as a larger line, but not the proper volume of air; the tool would have rated speed, but not enough power in some uses. It's like a 3/4-inch water line, opened, giving pressure but not volume of water that a one-inch water line would give.

Other factors include Gate valves which were provided in air lines to work stations, within reach of a maintenance worker at floor level so that should the line need closing for one reason or another, it would not require a step ladder or special effort. Also, regula-



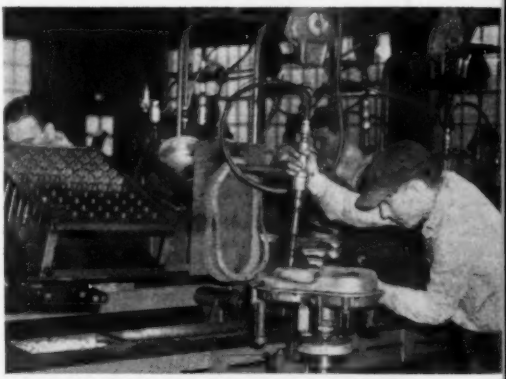
Closer view of line shows special tote pans and bins, sloped toward worker for better access to parts; seen below conveyor is shelf to slide sub-assemblies across from other side of line.

tory valves at air presses, for instance, permit turning down of, say 90 pounds line pressure to requirements of the application, which might be much less pressure.

Again, thinking of worker comfort and efficiency, air presses here, when venting or exhausting a cylinder on return stroke of the press piston, pass the air through mufflers. This reduction of noise on the production line makes for more comfortable working conditions.

The air tools are regularly inspected; slip clutches are checked to see if the right pressure is being exerted. The stock room tries to keep a "spare" tool for every operation, and tries to keep the tool inventory of a single make for each operation, to reduce maintenance and parts costs. A "kit" is kept ready for refitting each tool, so it is but a matter of minutes for rebuilding a tool following a breakdown of some nature.

Photos and Data Courtesy Compressed Air and Gas Institute • • •



Some more details of same line, at next work station; gear case is nearing completion, as seen. Eight or more men work both sides of the 50 foot assembly line.

transfer machine achieves

High Production Rates

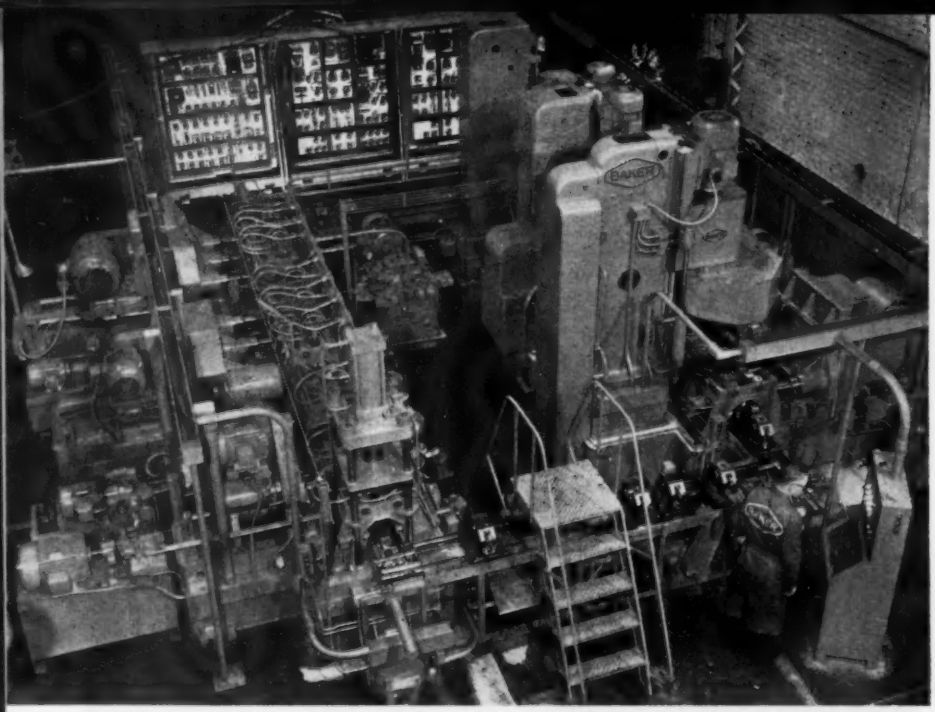
on wide range of valve body sizes

- **Extreme range of part sizes**
- **Minimum downtime for part changeover**
- **Compact space requirements**
- **Greater accuracy than single-operation machines**

● This month's featured machine was developed by Baker Brothers, Inc. Toledo, for the complete machining operations on steel gate valves for The Hancock Valve Division of Manning, Maxwell & Moore, Inc. The machine was designed for flexibility to handle valves from ⅜ in. to 2 in. size with minimum changeover time between runs.

Valve bodies to be machined are steel forgings on which dimensions are held closely enough to permit chucking in two-jaw chucks, with interchangeable vee jaws to establish both the flow section centerline and part centralization for vertical operations.

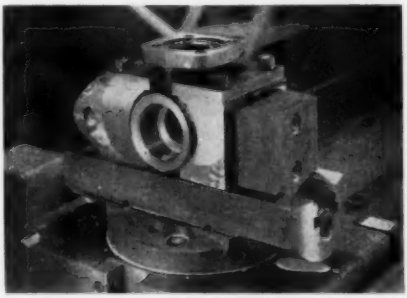
Changeover time from one size valve to another is kept to a minimum by designing tooling and spindle ends so that settings of basic machines are constant from one size to another. The variation in sizes is compensated for in the adapter lengths for various tools and in the tools themselves. Jaw changes on the fixture platens are also required, to withstand tool thrusts.



12-unit Baker transfer machine for valve body machining, with control circuit panels open in background. Operator loads and unloads parts manually at main control station. Fixture platens retain same orientation throughout counterclockwise movement around machine, eliminating the need for turn-around stations.

A total of 236 hp is incorporated in the machine, including all machining and transfer elements. Largest machining motor is 25 hp. The 12-unit machine is designed as a rectangle rather than an inline machine to keep the number of platens at a minimum. In the counterclockwise circulation of fixture platens there are only nine idle stations, and these are necessary only to facilitate access to tooling. An inline application would require extra platens "in transit" because of the distance from one end of the

Fixture platen for transfer machine. Total of 5¼ pounds of stock is removed in machining 2-inch forged valve shown in chuck.

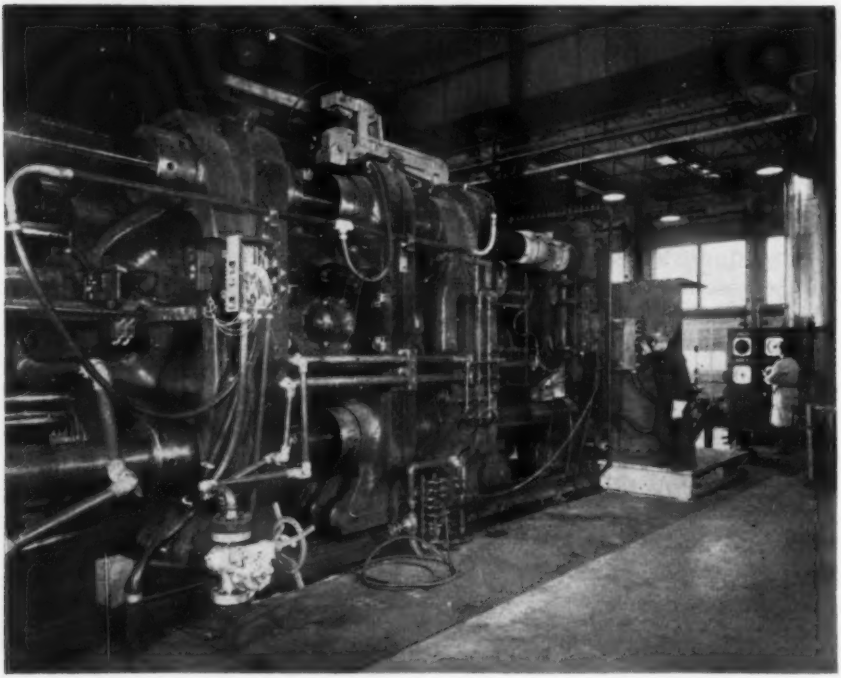


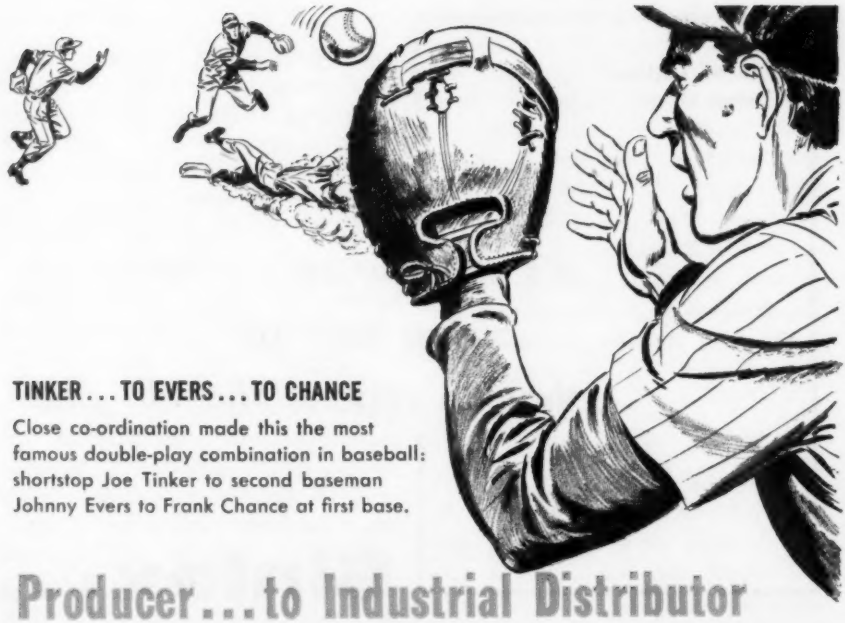
machine to the other. Cycle and index times become factors also, as it is desirable to have complete control over the platen at all times. The rectangular construction also has advantages in floor space requirements—this machine occupies a 22 by 31 foot floor area, whereas an inline version would be an estimated 71 feet long.

Fixture platens slide on hardened steel rails and have guide ways on each side. Positioning is done by horizontal, hydraulically actuated wedge-type shot pins. In addition, four hydraulic hold-down clamps located at each corner of the platen serve to clamp the platen at each machining station.

Estimated production at 100% runs from 103 valves per hour for the ⅜ in. size to 50 per hour for 2 in. valves. • •

Automotive engineers are closely watching developments in die casting of engine blocks. This experimental 250-ton Doehler-Jarvis machine produces 30 to 35 six-cylinder aluminum blocks an hour. Similar machine for V8 blocks is under development.





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Circle No. 295 on Card, Opposite Page 65

By **D. M. Carlson**
Assistant Editor

it's cheaper to buy a new bit than to regrind the old one

Sintox...

revolutionary cutting tool?

The new bits are cheap enough to be thrown away when worn, eliminating the need of grinding. Square bit in foreground incorporates chip-control groove.

● Sintox—a new entry in the synthetic cutting tool field was introduced at the Chicago ASTE Show by Sintox Corp. of America, Allentown, Pa. Demonstrated in a number of turning operations, the new line of inexpensive throw-away bits were shown to have the ability to cut with a wide range of cutting speeds, feeds, and depths of cut. The same bit was shown in a number of roughing and finishing operations, with varying amounts of stock removal, showing a remarkable range of capability in this respect. Interrupted cuts were also

taken on demonstration hex stock work-pieces.

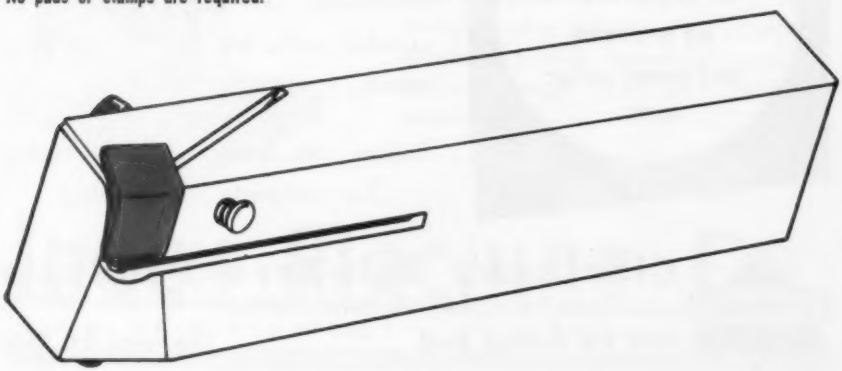
The material is so inexpensive that tools made from it are considerably cheaper, so cheap in fact, that they can economically be thrown away, rather than resharpened after their cutting edge finally becomes worn.

The new bits are available in round, square and triangular type inserts with companion toolholders developed to take advantage of the new material's properties. The special toolholders grip the insert around the sides and support it from beneath by simple setscrews; no top clamps are employed, and it is claimed none are needed. The molding method by which the blanks are formed permits the incorporation of chipbreakers or chip control grooves right in the bit itself, eliminating the need for auxiliary chipbreakers.

The basic material from which the Sintox bits are made has been available in England for some time, but only recently has the material been developed for practical use in this country. Aluminum oxide is the primary raw material, and it is combined with other oxides and formed under heat and pressure in a method which has not been disclosed. It is said that no bonding agent as such is employed, which would make it differ from the typical ceramic or cemented oxide material.

In the practical development work on the new bits and holders, the basic problem of metal cutting was re-examined in such a way that research did not depend on previous work on other materials such as carbides and ceramics—hence the entirely new toolholder design. • • •

A special tool holder must be used with the new bits. It consists of only two parts, shank and insert. No pads or clamps are required.



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Circle No. 297 on Card, Opposite Page 65

Cuts Part Costs From $.70 to $.03

By **H. W. Merrow,** Plant Manager
Lewis-Shepard Products, Inc.
Watertown, Mass.

Lewis-Shepard uses a wheel suitable for stock removal and which delivers a finish of 12 to 14 micro all in one operation . . . developed techniques of working from oversized stock . . . designed and built a bar grinding attachment for handling long stock . . . designed and built a straightening machine to handle bent stock.

● One of the best ways to observe the development of centerless grinding techniques is to examine the progress made by a company that has employed the use of centerless grinding for their productive needs for several years, Lewis-Shepard Products, Inc., Watertown, Mass., manufacturer of industrial trucks.

A chrome-plated steel plunger which is an integral part of the hydraulic unit on Lewis-Shepard trucks has been successfully ground on a centerless grinder. This application produced parts far faster than previous methods while achieving the required tolerances and finishes demanded.

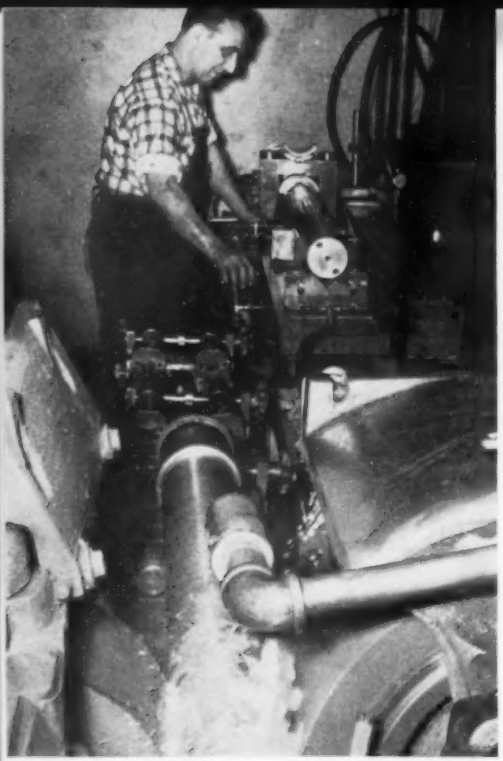
Lewis-Shepard originally ground these parts between centers at an approximate cost of $.60 to $.70 per piece. They subcontracted these parts to a company who centerless ground them for $.20 per piece. Finally, Lewis-Shepard ground the parts themselves for $.03 per piece.

The plungers to be ground ranged in size from 1½ to 3½-in. in dia. and anywhere from three to eight feet long, and were made of standard seamless C-1015 steel tubing.

Working together with the Cin-

→

Opposite: grinding a cylinder at Lewis-Shepard the centerless way. Bar roller supports are on hinges. As collar on cylinder approaches, each pair of rollers is dropped momentarily to let collar pass.



Straightening one cylinder as another is being ground (foreground). Machine, designed by Lewis-Shepard, straightens and tests cylinders, in one quick operation.

Centerless Grinding

continued

cinnati Milling Products Div., of Cincinnati Milling Machine Co., Lewis-Shepard tested various grinding wheels, searching for a wheel to meet its requirements.

The wheel for the job had to give maximum stock removal, but at the same time be able to produce a finish of twelve to fourteen micro-inches. The necessity for one wheel to do both rough and finish grinding was brought about by the fact that most of the work to be done on the grinder was "in short runs" (25 to 30 plungers at a time) and changing wheels for roughing and finish would take from one-half hour to an hour each time.

Several wheels were tried on the grinder before a satisfactory wheel was found. The wheel that was finally picked as "most suitable" was a vitrified wheel, aluminum oxide, 46 grit, L Hardness, 5 structure.

To illustrate what kind of life is obtained from a grinding wheel during this type of operaation, in grinding a plunger two inches in diameter and six feet long, the machine is set to remove between five and seven thousandths at each pass. The wheel is dressed approximately every twelve plungers. Under these conditions, a grinding wheel lasts a minimum of two to three months. The regulating wheel, of course, lasts much longer.

The length of the part discussed created a production problem because the original set-up did not include a long bar grinding attachment which acts as a carrier or support for long work as the material is being fed through the machine. In grinding without this equipment, it was found that finish and tolerances were extremely difficult to maintain. There were available attachments of this nature on the market but the personnel of this company felt that more flexibility of set-up was needed for their opera-

tion. A specially built long bar attachment was designed and produced by them. This long bar attachment proved so successful that Lewis-Shepard manufactured and installed several of these items in other machine shops. The most noteworthy feature of their bar grinding attachment was the fact that it could be assembled to the machine in about one hour without overhead crane service while other bar attachments required crane service and a noticeably longer mounting time.

Some of the units to be ground required a collar fitted to the plunger. This was handled as an "infeed" job on the grinder, but a problem arose as to how these units could be worked with the bar grinding attachment. To solve the problem, the Lewis-Shepard men put the bar roller supports on hinges and as the collar approached each pair of rollers, that pair was dropped momentarily to let the collar pass.

With the successful completion of work on the grinding wheel and equipment aspects, Lewis-Shepard then turned their attention to a problem of surface imperfections in the steel part. These imperfections were present in the steel when purchased and with a minimum of stock removal allowed, these surface defects would not

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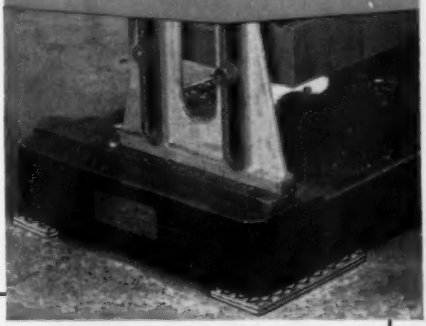

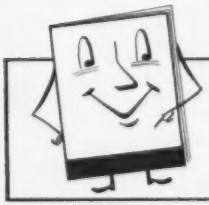

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Circle No. 298 on Card, Opposite Page 65

Centerless Grinding Cuts Costs

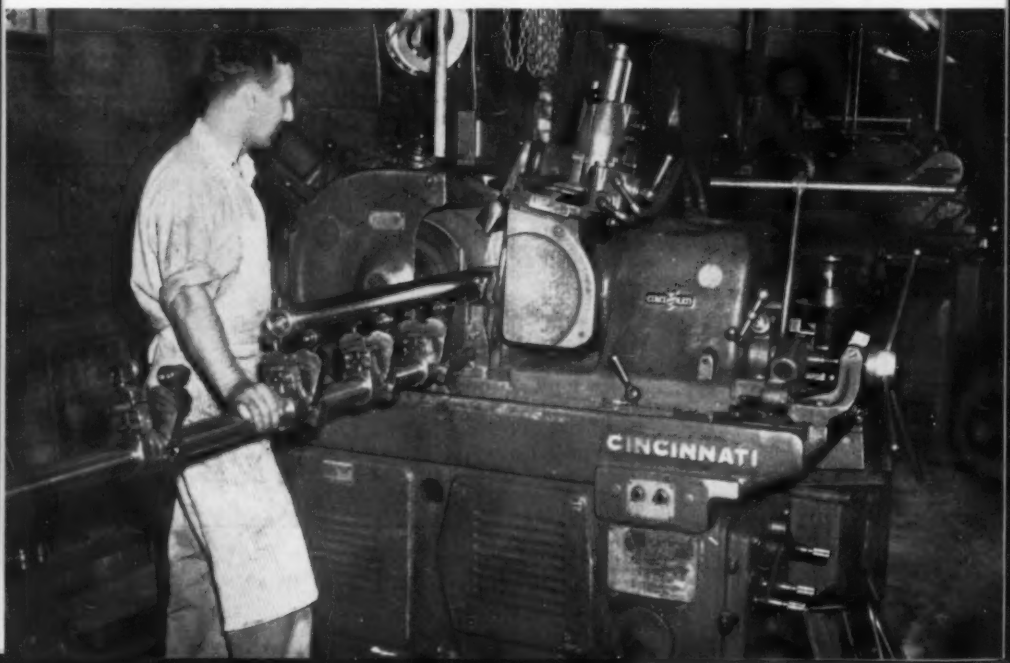
continued

"clean up" or grind out. The solution to this problem was brought about by purchasing "oversized stock." Lewis-Shepard found that to remove these surface defects they were required to purchase their stock .020-in. to .030-in. over the finish dia. By taking these steps they were able to produce a ground part which, when chrome-plated, met their most rigid requirements.

A contingent problem to the centerless grinding difficulties was the straightening of stock for the plungers. Raw stock, in many cases, had "bends" or "snakes" which required long and tedious work to remove. A special straightening machine was devised to measure the defects as well as correct them.

Straightening machines were available, but on these machines it was necessary to straighten the plunger in one position and then move it to another position to test it. The machine made by Lewis-Shepard straightens and tests the plungers without moving them because the test rollers retract hydraulically leaving the plunger in position to be straightened. This operation can be performed so quickly that the operator can straighten a plunger while another one is passing through the centerless grinder. • • •

View of long bar attachment indicates how lengthy cylindrical material can be fed accurately into the machine.



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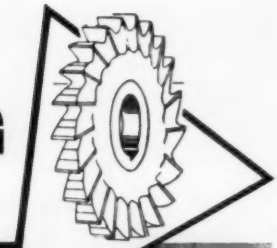

A recent national survey of high speed steel tool manufacturers (making items similar to the milling cutter shown above) indicates that much time is wasted in grinding tools after hardening.

Many furnaces do not maintain adequate richness of atmosphere at high speed steel hardening temperatures. This necessitates subsequent grinding and finishing operations.

With Sentry furnace equipment employing the positive Sentry Diamond Block atmosphere, tools may be soaked to assure maximum hardness characteristics and come from the high heat absolutely free from scale or decarburization. Sharp cutting edges are faithfully maintained and little or no finishing operations are required.

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Circle No. 300 on Card, Opposite Page 65

Is An Employee Entitled to a Merit Increase If He Does the Same Work as Higher Paid Employees?

What Happened:

Walter Mattie was making $69.80 a week. Shea and Bailey, two men who worked with him were earning $74.00 a week. All three men were working about the same number of years. Mattie demanded that he get a merit increase to bring him up to his two buddies.

"I have the same duties," he said to the arbitrator. "In fact, when one of us is on vacation we interchange jobs." The company's position was that merit raises are up to the company and it has discretion as to who gets such boosts and who doesn't. And besides, it's not up to the arbitrator to horn in on a management prerogative of this nature. The company further contended that while the men did similar work, in its opinion Shea and Bailey were more efficient.

Was the Company:

RIGHT ☐ WRONG ☐

What Arbitrator I. Robert Feinberg Ruled:

"A merit increase may generally be said to be an increase granted an employee because of improved quality and quantity of work. It does not represent a change of job duties but on the contrary represents improved efficiency on the part of the employee in continuous performance of the same duties. It has been said that merit rating is concerned not with what an employee does but how he does it. It is recognized that determination of an employee's merit can best be made by his supervisor who is closest to the employee in these matters. In arbitration cases of this sort it is generally held that the initial determination as to whether an employee is entitled to a merit increase shall be made by management and the conclusions of management with regard to merit increases should not be set aside unless the facts show that it has been unfair, or discriminatory or arbitrary, or that

Can he get a merit increase?

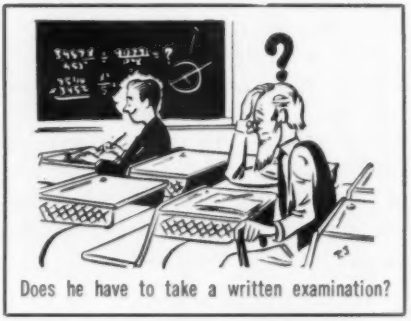
continued

the decision has been based upon insufficient evidence. Since merit increases are not concerned with what an employee does but how he does it, Mattie's argument that he performs the same work as Shea and Bailey has no validity. The grievance is denied."

Can You Require an Applicant for a Promotion to Take A Written Examination?

What Happened:

The company had this policy on promotions: "All vacancies shall be filled: first, by the senior employee in the department, and second, it is understood that an employee must have the ability and physical fitness to perform the job." When a new job opened up the company posted the opening on the bulletin board. But, one of the requirements was a written examination. John Sommers, a senior worker refused to take the exam and was disqualified. Virgil Evans, who had less seniority took the examination and got the job. Sommers said, "You can't do that because the policy says nothing about written examinations." But management countered, "Oh yes we can. This is one way for us to find out who has the ability for the job, and we can, as a management prerogative, set up a written exam as one of the qualifications."



Does he have to take a written examination?

Was the Company:

RIGHT ☐ WRONG ☐

What Arbitrator Herman L. Barnes Ruled:

"According to company policy, long in effect, a senior employee must be advanced to a new job or vacancy if in the judgment of the company he can perform the work in a satisfactory manner. Nothing is said about a written examination. The senior worker must, therefore, be given a chance to prove his ability by working on the new job."

When Can You Fire a Disabled Employee?

What Happened:

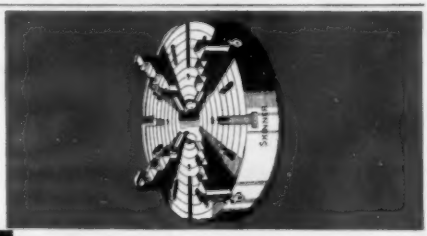
One morning Lincoln Taylor reported to the nurse, and complained that he had hurt his knee while working. He was given some heat treatments and sent home. The next day he was examined by the company's doctor, and an operation was advised. He came back to work about a month later but refused

to take his old job back because, he said, it required some bending and he was unable to do this without pain. He was given a job of "light work" in the storeroom. The company didn't need an extra man in the storeroom but Taylor was put there until something suitable for him should come up. Management then tried Taylor out on 3 other jobs where vacancies occurred, but each time he claimed that the work was too difficult. The company finally sent Taylor to 2 outside physicians for a medical opinion on the kind of work he could do, in view of his bad knee. When the medical report came down, the personnel man after analyzing its contents, offered Taylor his original job on the contention that the doctors thought

Fire a disabled employee?

him well enough to handle it. When Taylor balked, he was let out. He promptly filed a grievance for dismissal without cause. The company stood its ground. It maintained that in its opinion Taylor was malingering and that he was looking for a soft job. Then again, said the company, "we tried to find other, less

For tough jobs in the toolroom...



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Circle No. 301 on Card, Opposite Page 65

Right — Wrong

continued

arduous jobs for Taylor and he didn't want them. (It so happens there were very few "light" jobs in the shop.) We cannot create a new job to his liking, nor can we fire a more senior man to make room for Taylor."

RIGHT ☐ WRONG ☐

What Arbitrator Paul Prasow Ruled:

"It is acknowledged company practice to attempt to place employees with disabilities on work they can do insofar as this can be accomplished within limits of seniority and efficiency. Moreover it might be argued that the company had a moral obligation to provide light work for Taylor. The record shows that supervision made repeated efforts to place Taylor in available light work, and even suggested to senior employees who held lighter jobs that they trade such jobs with Taylor. These efforts met with no success. There is no evidence to indicate that employees with less seniority than Taylor were working on light jobs which he could perform. It is possible that Taylor could not physically perform his work as he indicated on numerous occasions. In the last analysis pain is a subjective experience, and those who claim to suffer from it know best whether or not they can function. However in the face of medical findings to the contrary, an employee insists that he cannot perform his assigned duties, and if management makes reasonable efforts to find him lighter work and is not arbitrary or capricious in its actions or attitude, then the decision to terminate him must be considered a bonafide exercise of management discretion related to efficiency and safety in operating the plant. The grievance is denied." • • •

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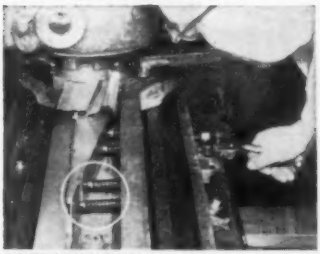
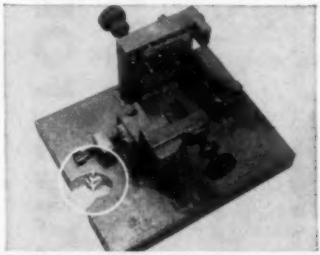
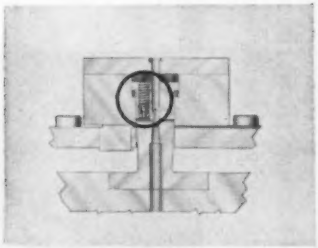
Thousands of companies are making drastic savings by using standard Vlier Tooling Specialties instead of costly custom-made substitutes. The applications shown below are only the *obvious* uses for these simple, inexpensive tooling specialties.



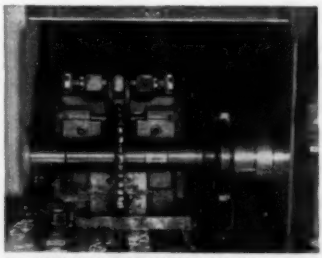
CLAMPING OFF-ANGLE PARTS in jigs and fixtures is a cinch with Vlier Swivel-Pad Clamps. Pad swivels on a ball, 7½° each side of center line. Can't bind or damage part surface. Socket set models can be inserted from either end.



PERFECT ALIGNMENT OF JIGS AND FIXTURES ON MILL TABLES is assured every time with Vlier Fixture Keys. Each key is precision machined to three table slot dimensions, enabling the job to be run on any suitable mill in shop.



NEED ACCURATE, UNIFORM SPRING LOADS? Vlier Spring Plungers really pay off when positioning parts in jigs and fixtures. Spring loads are accurately set at the factory; stay constant. Plunger telescopes completely.



THE RIGHT AMOUNT OF CLAMPING PRESSURE AND NO MORE! There's no distortion of the part when Vlier Torque Thumb Screws are used to clamp it in the jig or fixture. Once predetermined end pressure is reached, the head turns freely. Working parts are protected from foreign matter.

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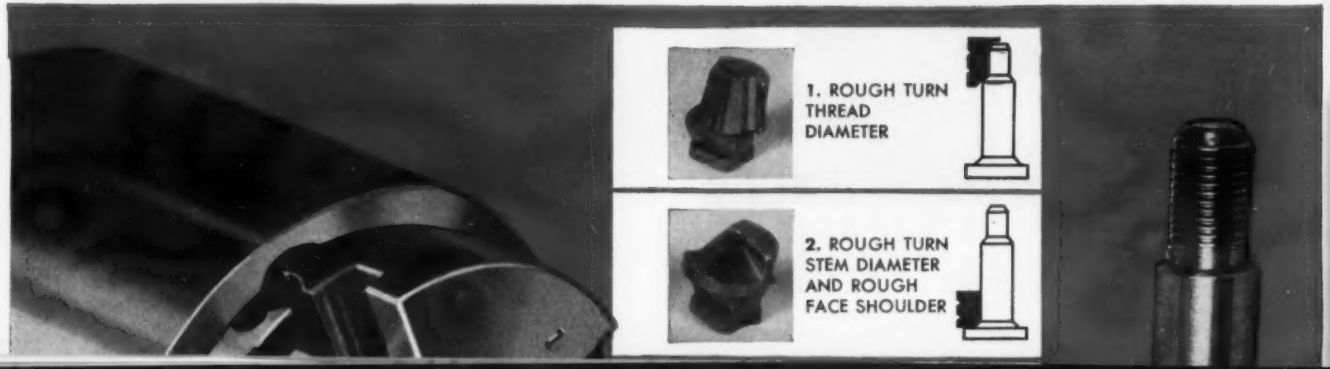
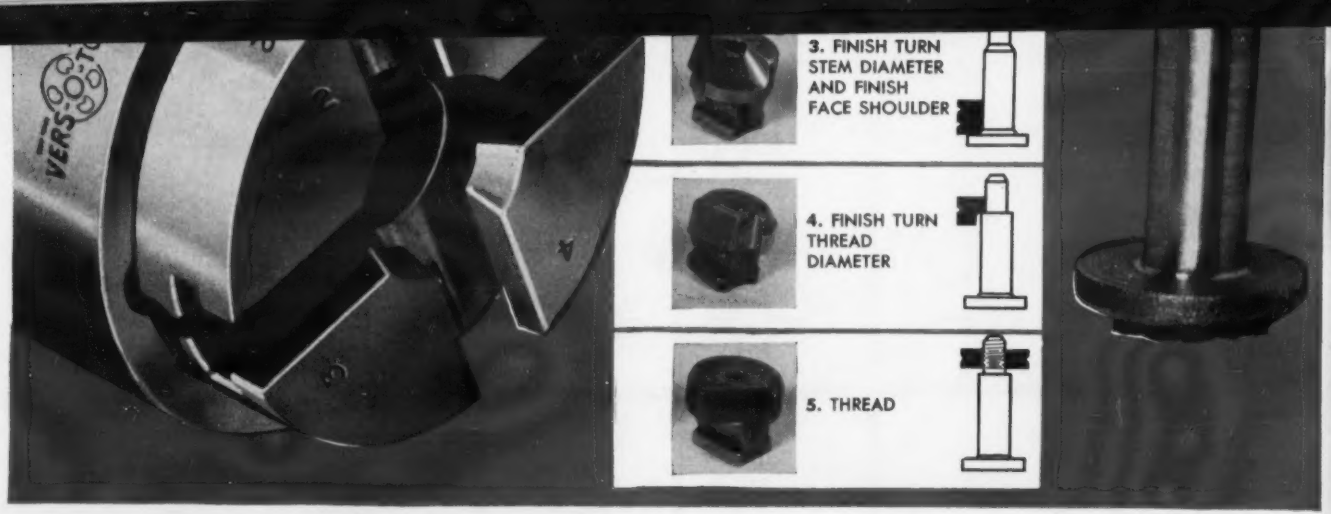
Circle No. 303 on Card, Opposite Page 65

HERE'S HOW NAMCO VERS-O-TOOL

CUTS COSTS... SPEEDS PRODUCTION ON END TURNING AND FORMING

In this application 300 lever supports an hour are turned out on a vertical six-spindle automatic. Vers-O-Tool machines these steel forgings three times faster than single point tools, opens at the end of the cut, leaves no spiral marks on the work.





Vers-O-Tool licks tough production problems because:

1 Basic Vers-O-Tool design permits cutters or ground thread chasers to be changed quickly without adjustment in the head.

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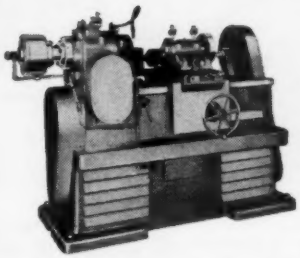
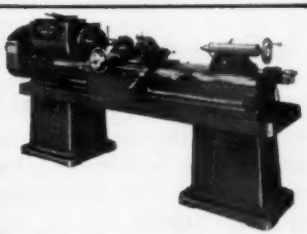


1 "H1" Completely automatic for precision internal and external right and left hand threads, 4 to 50 per inch. Internal: ⅝" to 8". External: 3/16" to 7".



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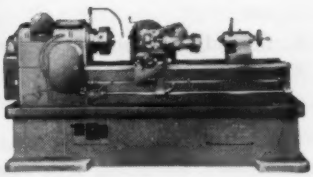

3 "THREADMASTER" Produces, automatically, long and short traversing, elevating, cross feed lead screws with over 55 changes of the work spindle. Mills threads from 1/3 to 20 per inch and leads from .05 to 5.5".

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Circle No. 306 on Card, Opposite Page 65

proper selection of
Carbide Face Mills
involves five factors

The keys to carbide face mill selection are described in this article which is intended to aid production people in face milling operations. The factors outlined are: Tips, Carbide, Angles, Chip Clearance Space, and Number of Teeth.

By **Horace Frommelt**
P. M. Cutter Co., Inc.
Chicago, Ill.

● Factors affecting the selection of a face mill are:

1. Tips—(a) brazed, (b) solid and mechanically held, (c) indexable, (d) expandable, (e) PM held.
2. Carbide Grade—(a) tungsten carbide, (b) tungsten titanium carbide.
3. Angles—(a) positive, (b) negative, (c) clearance, (d) corner.
4. Chip Clearance or Pocket.
5. Tooth Pick (Number of teeth).

The brazed tip is still to be considered. Brazing was resorted to at the beginning of the carbide era, first, because of carbide cost, second, its physical characteristics and, third, because of the lack of knowledge concerning carbide. There was only one economical manner of using it—brazing to a steel shank or body. But since the coefficient of expansion and contraction of steel and carbide is as 2 to 1, the tungsten carbide is stressed to the cracking point, fig. 1.

It is certainly true to say that the vast majority of run-of-the-mine production jobs should shun the brazed tip design in milling cutters. Yet there are instances, perhaps, when a brazed tip cutter should be chosen. Some very special job

CARBIDE BRAZED TO STEEL. SHANK SHRINKS TWICE AS MUCH AS CARBIDE. CARBIDE IS PLACED IN TENSION ON ITS CUTTING SURFACE - NO STRENGTH IN TENSION.

1. Carbide brazed to steel.

2. The cost of each station (blade and wedge) is bound to be high.

requiring a special design but which is *short run* could well justify a piece of boiler plate with notched periphery into which carbide is brazed. The incidence of such jobs is extremely low.

The solid chunk of carbide presents a far better deal for increasing production than the brazed tool. It too has its limitations, but first, the advantages.

The first is greatly increased strength and resistance to the impact type of blows that a cutting element is subjected to in the milling process. Because it is not soldered the carbide is stronger; and because it is wedged and backed up by a solid chunk of steel (shank or body) the loading of this design can always be on the heavy duty level. The second advantage is the reduction of grinding headaches. The reconditioning of the solid blade—solely because it is not brazed—is far easier than if it were attached to a shank or body.

Some solid blades are designed to be ground in jigs outside the body. Some solid blades, usually of the indexable design, can be returned to the manufacturer or tool maker for grinding in his shop.

The cost aspect of grinding carbide blades for cutters should be carefully analyzed. Grinding of steel-cutting grades of carbide with a diamond wheel can be a very costly item.

The central and primary disadvantage of this design is its first cost. Note that in figure 2 the cost of each station (blade and wedge) is bound to be high in view of the very fine tolerance grinding necessary on the two sides of the blade, the wedge sides and the slot sides. If these are not ground to tenths tolerance for parallelism the wedging of the blade will crack and rupture it. The first cost of this specification is relatively high. The increased production possibly warrants it.

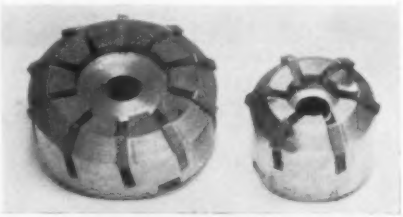
The indexable blade is of some symmetrical geometric shape such as a square, triangle, hexagon

continued

or octagon. All of these including the round have been, and are used in both milling cutters and single point tools. The ability to index a square blade eight times means less down time on the machine between cutter reconditionings and less cost for grinding. The indexable blade decreases down time and hence may be given preference over any other cutting element—depending on the job and the machine.

Expendable Blade—Low First Cost and Reduced Operating Costs. ***The expendable bladed*** tool is a front runner among the single point tools, as yet not so prominent in milling. Where it is effective and a good design is laid before the prospect, it should be given full consideration.

No matter how well executed the grinding operation or how carefully its technique is followed through, grinding is always detrimental to carbide. Grinding actually desharpens carbide, at least in the sense that each grinding cycle reduces the effectiveness of the carbide cutting element. The reason for sharpening carbide blades in a milling cutter is not to "sharpen" them but rather to bring the cutting edges all into the same circle or plane. The expendable blade, if the first cost is sufficiently low, should be considered because it eliminates the destructive action of the abrasive wheel, diamond or other, on the carbide. To eliminate brazing and wedging disadvantages, powder metal, figure 3, is now used to grip



3. To eliminate brazing and wedging disadvantages powder metal is now used to grip a piece of carbide for cutting.

a piece of carbide for cutting. This accomplishes several things:

(a) the powdered metal is a dampening material and hence the blade does not vibrate in the cut.

(b) The cost is a fraction of other methods. The molded parts of powder metal can be produced at a "low first" cost.

(c) Grinding is entirely eliminated. In the available designs milling cutters are presented to industry with no grinding; the first cost is such that industry cannot afford to re-condition such cutters. The body and blades are discarded as a unit. Copper impregnation increases the tensile strength to 75,000 to

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ROTATING CUTTING TOOLS CARBIDE-TIPPED

Circle No. 307 on Card, Opposite Page 65

continued

90,000 pounds per square inch; sufficient for any cutter application.

The disadvantages can be summed up by saying that unless an expensive mold can be justified for a finger or body the PM method is very likely uneconomical. Hence, for standard milling cutters, particularly for standard face mills, the PM design is worth considering.

Carbide Grade — Second Factor Affecting Cutter Choice. The discussion here in regard to carbide as a selection factor will be strictly limited to a very brief statement concerning the use of tungsten carbide and tungsten titanium carbide.

Tungsten carbide is a plain mixture of powdered carbon tungsten and cobalt. This kind of carbide is used on cast iron and all non-ferrous materials. Never consider any other grade of carbide for these applications unless it has to do with cast iron of the later mixes in which the BHN runs as high as 220 or more and which is a semi-steel. Then it may be well to consider the use of the other kind of carbide–tungsten titanium carbide.

Grinding of Tungsten Carbide —A Factor in Selecting Cutters. Tungsten carbide is less difficult and costly to grind. It can be conditioned by using a so-called "green" wheel instead of a diamond. If at all possible in the application of carbide to a metal cutting job select tungsten carbide–it's cheaper, easier to grind.

Tungsten Titanium Carbide— Advantages and Disadvantages. The steel cutting grades of carbide contain, besides carbon and tungsten, such elements as titanium and tantalum. These combine to produce a cutting element that is remarkable in hardness, strength and wear characteristics. For the harder materials, the stronger materials in the steel and steel alloy class this kind of carbide must be chosen. There is no alternative. It is more expensive in both first cost and upkeep. And above all it is more difficult to grind.

There are a number of reputable concerns in the field today whose advice should be listened to when it comes to grade selection. These manufacturers have specific recommendations regarding the grade of carbide of their make to be used for various types of jobs.

Angles—The Third Factor in the Selection of Face Mills. The axial and radial rake angles may be positive or negative. When the radial and axial angles are both positive, this cutter design is to be used only on the less difficult to machine materials. The reason for

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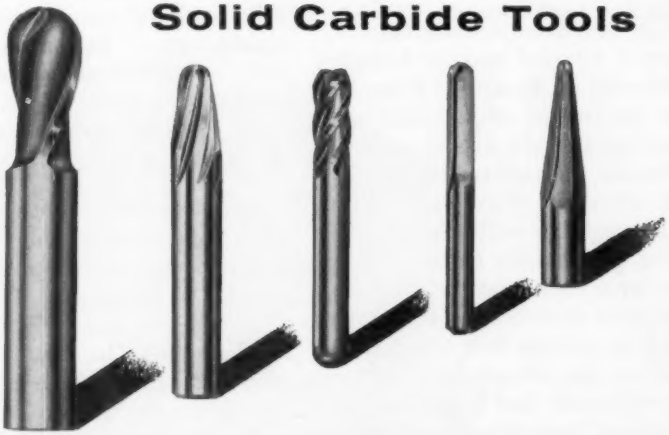

Yes, carbide *IS* the tool of today and tomorrow! But it's *not* just a case of throwing out high speed tools and replacing with carbide. Extra power is needed. Many factors have to be correlated to determine the correct grade of carbide and the correct operating data for each job.

Now — thanks to P&W cutting tool know-how and experience, supplemented by a 10-year program of special carbide research — you can be SURE of the right carbide tool for every job. Send us your work blueprints; tell us the types of machines involved; we'll be glad to submit our recommendations.

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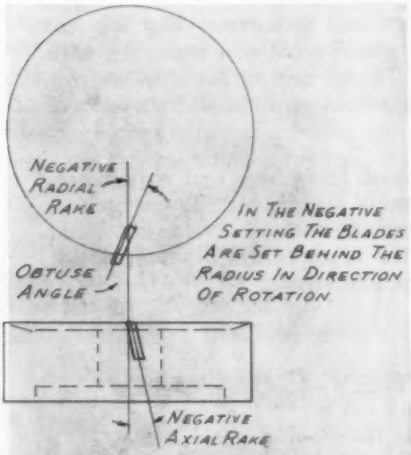
continued

this is clear from the discussion that follows concerning negative angles.

Negative radial and axial angles are shown in figure 4. Here the angle the cutting edge makes with the radius and the axis is negative or "behind the radius and the axis in the direction of rotation". Without the negative angle carbide machining, particularly milling, would never have been possible. The reason is plain as indicated in figure 4. Here it is obvious that the carbide blade has the advantage of an obtuse angle—one that is greater than 90 degrees. The cutting forces strike the blade at a 90 degree angle. Hence with the cutting edge having more than 90 degrees behind it, the blade is placed in compression. If it were subjected to tension, it would rupture. In compression carbide has tremendous strength; in tension it is negligible in strength. So the negative angle is a must for the milling of steels and steel alloys.


NEGATIVE RADIAL RAKE
IN THE NEGATIVE SETTING THE BLADES ARE SET BEHIND THE RADIUS IN DIRECTION OF ROTATION
OBTUSE ANGLE
NEGATIVE AXIAL RAKE

4 Radial and axial negative angles.

It is necessary that the "effective angle" presented to the steel job is negative. Hence the radial angle can be negative, say 12 degrees, while the positive can be positive, say 7 degrees. The resultant angle is something like 5 degrees negative. This is shown in figure 8. The Cincinnati Milling Machine Company in its booklet "Recommendations For Carbide Milling" has some excellent advice in this regard.

Why the Combination of Positive and Negative Angles in The Same Cutter? When To Choose a Positive Axial and Why? The positive angle, axially speaking, is almost a must. A cursory examination of figure 5 will indicate the reason immediately. Note that a positive axial angle directs the chips away from the work. Hence, the problem of chips getting wound up in the work and cutter, marring finishes and even stalling cutters is likely to be eliminated. In general, strong positive angles, all way

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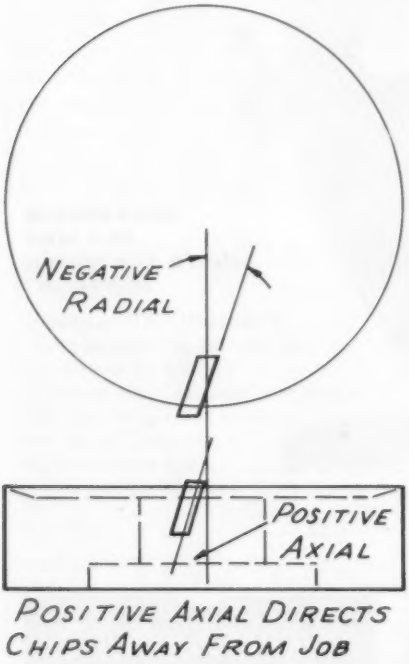
continued

round, are to be chosen for all the non-ferrous materials including the softer cast irons—30,000 tensile.

Choose negative angles when the cutting presures due to hard, resistant materials such as steel, semi-steel, and the alloys are such as to warrant the protection that comes from a negative angle.

Clearance angles are important.



5. A positive axial angle directs the chips away from the work.

There are three to be given serious consideration. First, the so-called OD clearance angle or the clearance on the OD of each blade that prevents it from heeling as it goes through the cut. Second, the dish angle which is the angle the face cutting edge makes with the plane of the work. To prevent drag this should be 3 degrees for steel and considerably higher for the softer materials. The harder the work piece the smaller the clearance angle. Also the third angle, which is the face clearance angle; or the clearance or the face cutting edge of the blade to prevent it from heeling as it goes through the work.

Finish is largely the result of the correct angle ground into the face cutting edge along the radius or in line with it. The less this dish angle the better the finish is likely to be. The larger, the rougher the cut, the more the individual feed lines will show on the face of the work.

One way to specify fine finishes is to specify zero dish angle in the clean up blade. This is shown in figure 6. Here one blade is ground high about .010" above the others and this zero line is ground not only higher but at a zero angle with the face of the work and, finally, its length must be at least as long as the feed per

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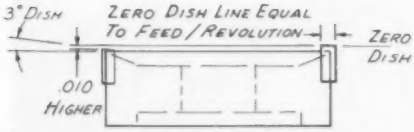
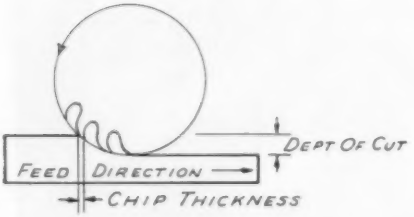
Circle No. 310 on Card, Opposite Page 65

continued



6. One way to specify fine finishes is to specify zero dish angle in the clean up blade.



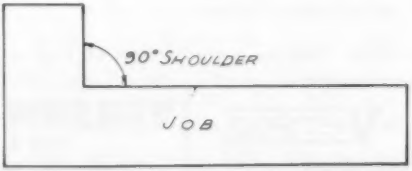
7. The difference between tooth load and depth of cut.

revolution. For example, if a cutter has 10 teeth and a feed per tooth of .010″ is taken, then the feed per revolution will be .100″. That is, the work will have fed into the cutter .100″ while the cutter makes one revolution. If the zero clean up blade is .110″ long then it will act as a sweeper blade and clean up all tooth marks on the face of the work. Note that this type of grind means that the OD of the Clean up Blade is the same as the others.

Difference between Depth of Cut and Tooth Load. ***Sometimes*** these two are confused. In discussing run-out on the OD of a face milling cutter, it is easy to confuse tooth load and depth of cut. The difference between the two is shown in figure 7. Here it is obvious that if one tooth is higher on the OD by .005″ than the others it will affect the depth of cut and not the tooth load. The tooth load will vary from tooth to tooth only when the distance between the teeth is not the same.

One of the most important of all the angles in cutting (milling specifically), is the corner angle. In selecting, fitting and adapting a cutter to a job be certain that the corner angle is correct. When can a 45 degree corner angle be used in face milling? For all jobs of face milling where the face is to be swept clean the corner angle cutter is a must. The shear effect of the 45 degree blades is such that the carbide lasts much longer than if a 90 degree corner angle is specified.

When it is necessary to mill to a 90 degree corner, as shown in figure 8, then the 90 degree corner



8. Use a 90-degree corner angle cutter for milling to a 90-degree corner.

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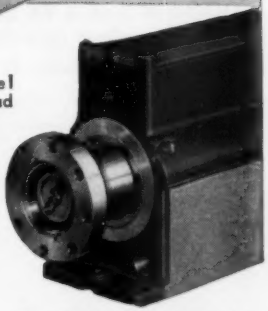
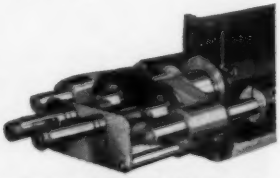


For Single Spindle Tapping, the TU-415 is furnished without quill flange and with ASA 1″ bore, adjustable adapter spindle.



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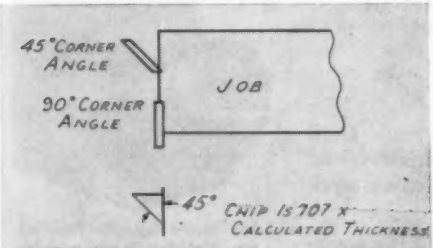
Circle No. 311 on Card, Opposite Page 65

continued

angle cutter must be chosen. But if the job specification permits using a radius or a chamfer on the corner of the blade then by all means use it. The life of the carbide blade with a chamfer or a radius is greater than the sharp cornered blade.

Chip Thickness and Corner Angle. When a 45 degree corner angle is worked into the cutter then the chip thickness is less by the ratio of .707 to 1. The reason is that the sine of the 45 degree angle is .707, figure 9. For example, assume that an 8″ diameter cutter with 20 teeth is being used on a 90 degree corner angle. The feed rate is 50 inches per minute. The sfm rate is 500, so the rpm is 250. The chip thickness is calculated as follows: Divide the 50 ipm by 250 rpm resulting in a feed per revolution of .200″. This result is now divided by the number of teeth and the result is the feed per tooth which is referred to as the tooth load or the chip thickness. In this instance the feed per revolution is .200″; the number of teeth is 20; hence the feed per tooth is .010″. If the corner angle is 90 degrees then the *actual* thickness of the chip is as calculated, namely, .010″. But if the corner angle is 45 degrees then the chip thickness is not .010″ in the same cutter, except for the corner angle, running at the same rate, but is .707 times .010″ or .00707″. The reason is clear from an examination of figure 14. If the chip thickness varies with the corner angle what other factors are changed? None. The actual amount of metal that is removed remains the same. The chip is thinner but longer and hence the volume is the same. The horse power, for all practical purposes, remains the same. But the cutter remains on the job longer and with a better cutting edge. Therefore, it is true to say that the horse power is less with a 45 degree corner angle over a long run.



9. Calculation of chip thickness for 45 degree corner angle.

In choosing a cutter, if the chip thickness has been specified as .010″ then the feed rate can be stepped up by almost as much as 30%. The reason is this difference in the chip thickness, calculated and actual. If the actual chip thickness is kept in mind then the calculated feed rate can be set considerably higher. It is this calculated feed rate on which the pro-

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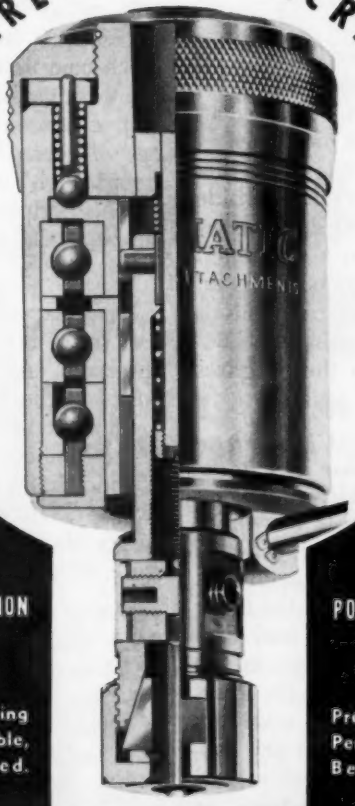

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Circle No. 312 on Card, Opposite Page 65

continued

duction schedule is established. Hence the importance of the corner angle.

Corner angles larger than 45 degrees are used in face milling for the reason just given. The calculated feed rate can be much higher than the actual; yet it is the actual on which the life of the carbide edge is based. If a 60 degree corner angle is used then a calculated chip thickness of .020″ becomes an actual of .010″. The tremendous advantage of this corner angle becomes apparent with these figures and this discussion.

Chip Pocket or Clearance Space—Fourth Factor in Choosing Cutters. The chip pocket or chip clearance space is shown in figure 2. The importance of this space cannot be over-estimated. Unless the chip formed by the tooth has space in which to curl and shape itself before being ejected from the tooth it will clog the operation, even stalling the machine. It is true, though seemingly fantastic, that a dragging chip will stall a 50 hp milling machine. If a chip is not cleared it will ride around with the tooth, become incandescent and weld to the cutter body or the work piece.

Fifth Factor in Choosing a Cutter — Number of Teeth or Tooth Pitch. Actually it would be ideal if the number of teeth in a milling cutter could be varied at will or as the job in hand demanded. It is usually necessary to make compromises on the basis of the number of teeth in the available cutter or cutters. The number of teeth leads to the term "tooth pitch" which is the distance, on the periphery of the face mill, between the cutting edges of the teeth.

Let us approach the tooth problem from, first, the ideal angle or approach. Assuming that the face mill has the proper corner angle, the first step in specifying the cutter is its diameter. For simplification assume that a 5″ wide job is to be swept clean in face milling. The cutter then ideally should be 8″ wide, 45 degree corner angle.

If the job is a piece of steel of SAE 1020, the chip load can be .010″ actual, calculated .015″. If a 50 hp machine is available and one that has been built for carbide milling (with climb nut adjusters) then the number of teeth in the cutter should be 20 for ideal operation. Calculation: 20 teeth times .015″ equals .300″ per revolution. If the rpm is set at 200 (sfm at 450) then the feed rate will be .300″ by 200 or 60 ipm. If the depth of cut is ⅜″ then the cubic inches per minute of metal

removal will be ⅝ square inches times 60 or approximately 40 cubic inches of steel per minute. This adds up to about 45 to 50 hp with a sharp cutter and allows something for cutter dulling.

What can be done if a cutter with fewer teeth must be used? The chip load can then be increased to .020" if the surface finish is not too important. Or the compromise must be made to run the cutter at fewer inches per minute feed rate and thus sacrifice production.

There is nothing to be done but compromise between the three factors of (1) chip thickness, (2) feed rate and (3) rpm accepting the fact that the number of teeth in the cutter are fixed. • • •

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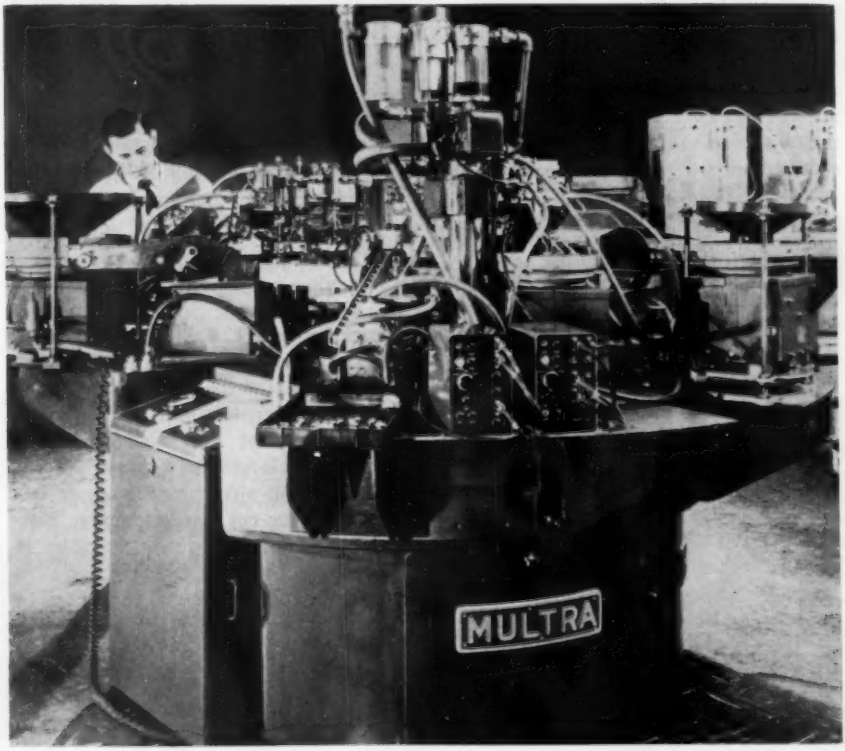
Automatic Assembly Machine

Automatic Assembly machine turns out mercury batteries at high rate of production, is capable of assembling wide range of products.

NORTH TARRYTOWN, N.Y.—A new multi-purpose automatic assembly machine called Multra is turning out be-

Multra automatic assembly machine set up for mercury battery assembly. Machine can be tooled for variety of products.



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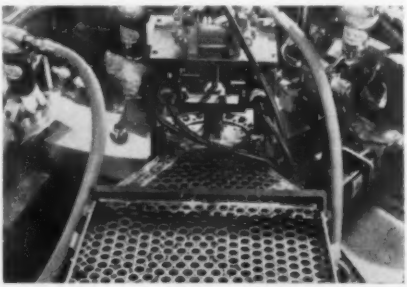
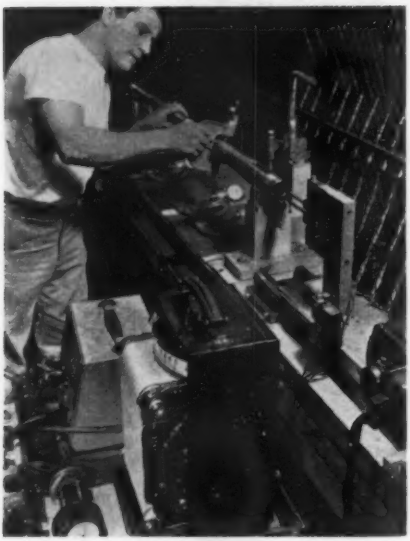
tween 15,000 and 20,000 mercury batteries per 8-hour shift on a regular production basis for P. R. Mallory & Co., Inc., North Tarrytown, N.Y. Unique feature of Multra unit is that by changing tools—requiring only a few hours—other products may be assembled on the same machine.

The multra machine, designed and built by Multra Corp., a subsidiary of Barnes Engineering Co., Stamford, Conn., automatically performs all battery assembly operations that normally require a human operator. The machine feeds, sorts, sizes, forms, orients and inspects five different battery parts, including such varied forms and materials as metal cylinders and caps, felt absorbent, neoprene grommets, pressed metal and a liquid electrolyte which is metered into the battery assembly.

Machine also features a "feedback" system. If a part should fail to be inserted at one of the stations, then the particular sub-assembly with the missing part is rejected at a later station but, meanwhile, no further parts are fed into it. There is room around the six-foot indexing table for 16 tooling stations although not all of them are utilized for the battery assembly operation.



Feeding station of Multra assembly machine. Parts are automatically sized, oriented and fed into the battery sub-assembly. Defective parts are rejected.



Ordnance Division of E. W. Bliss Company, Canton, Ohio, has boosted production on its 20 mm machine gun barrel line through use of unique electronic recording gage. Designed and built by the Cleveland Instrument Co., gage checks three separate tapers in chamber of barrel. Inspector checks barrel OD with standard snap-gage indicator, then gaging tips move into chamber. Movement of each tip is continuously recorded on a graph. Copies of graph accompany each barrel upon shipment. Chamber requires measurement of 5 datum diameters which are recorded in 0.0001.

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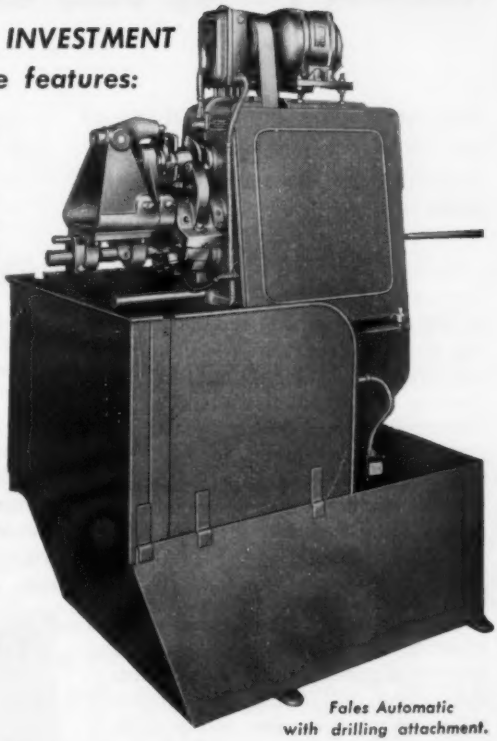

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Circle No. 315 on Card, Opposite Page 65

continued

Two-Way Planing Using Carbide Inserts

Rough, semi-finish and finish planing of steel and cast iron on both strokes of new-model Gray Planer is possible without tool resetting, using carbide insert tools.

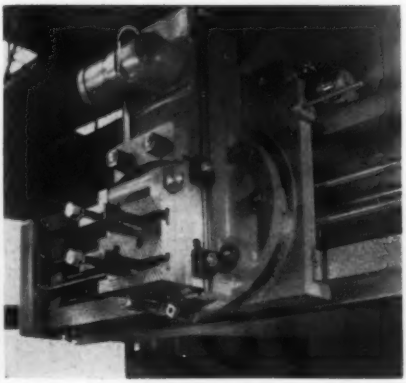
LATROBE, PA.—A three-in-one operation of rough, semi-finish and finish planing of steel and cast iron—without tool resetting and with only one slide positioning is performed on a new Gray Universal Planer using special tools fitted with Kennametal Grade K21 tips and inserts. Combination process consists of rough planing on forward and return strokes, finish planing during the forward stroke.

Mounted back-to-back in a special swivel-type holder with three degrees negative back rake and an equal amount of positive side rake, two heavy-duty square button inserts are employed in a typical operation, along with a broad nose finishing tool. The latter, mounted on a conventional continental type tool box, has three degrees positive back rake and 45 degrees negative side rake. Both tools, using K21, cut SAE 1025 steel and 175 brinell cast iron billets without modification of grind or cutting angles.

Steel cuts were made at 300 sfm, .078-in. feed, and ⅜ in. depth of cut. Cast iron cuts were made at .156-in. feed and .010-in. depth of cut. The cutting speed was reduced to 200 sfm to prolong tool life.

The broad nose finishing tool is mounted to provide the roughing tool a ½-in. lead, allowing the semi-finish cut to be made on each forward roughing stroke.

Combination of rough semi-finish and finish planing of steel and cast iron is now possible without resetting a single tool and with only one slide positioning. Broad nose finishing tool used in the operation has been removed from tool box in this view.



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continued

Electronic Gage Classifies, Marks Pistons

Automatic gaging unit which marks automotive pistons with code letter to indicate size has been developed by Federal Products Corp. of Providence.

PROVIDENCE, R.I.—An electronic gage that measures taper and outside diameter on automobile pistons, then stamps a code letter on the piston to identify the diameter, has been introduced by Federal Products Corp., of Providence.

Model shown is a semi-automatic gage. Gaging and stamping action is entirely automatic, but parts are fed and removed by hand. Gages with fully automatic feeding and sorting units are available.

The gage takes both measurements, i.e., taper between the top and bottom of the piston skirt and the OD at the upper end of the skirt, simultaneously. If taper measurement is not within tolerance limits, the gage's electronic classifier will ignore the diameter measurement and the part is rejected. If the taper is okay, there are six good diameter classifications differing by .0003 in. plus oversizing and undersize. Signal lights for each diameter classification enable the operator to see at a glance which category a particular piston falls into, and an ink impregnated stamper unit stamps the code letter indicating the diameter on the piston itself.

". . . Now cut 1/10,000 off . . ."

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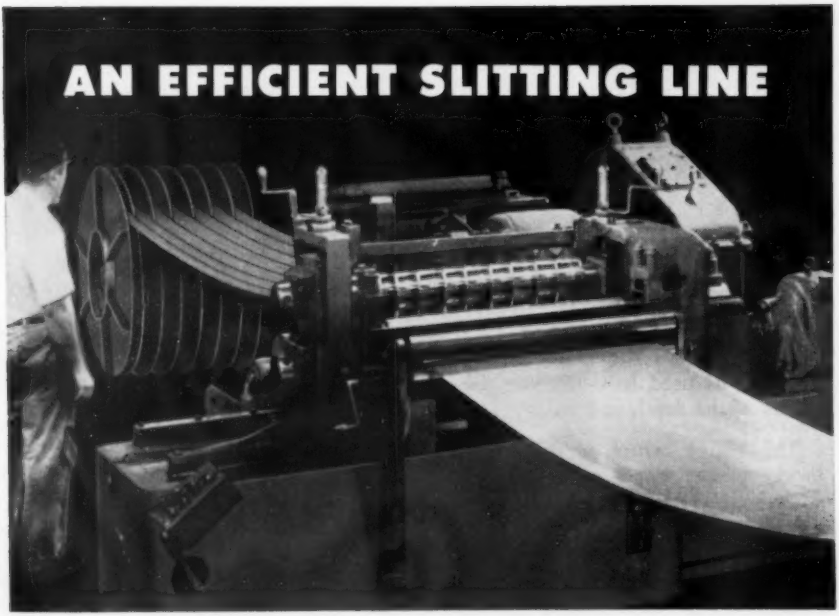

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Circle No. 317 on Card, Opposite Page 65

Center Angle Gauge

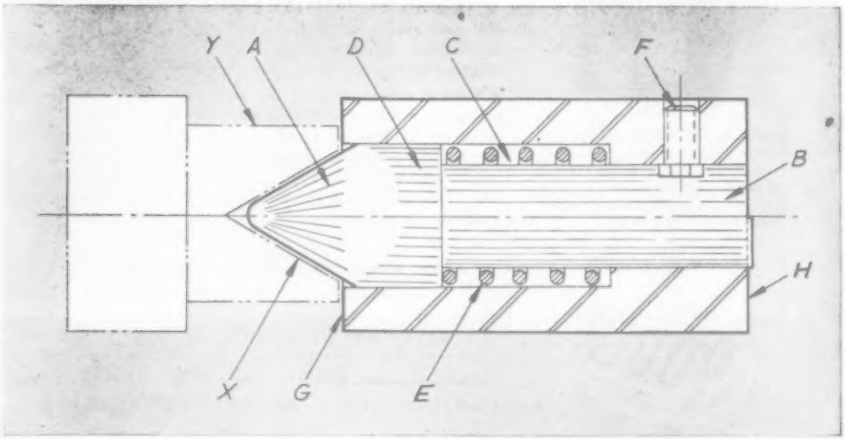
by **Alex S. Arnott**

To check the center angle (X) on work piece (Y) the gauge shown in Figure 1 is used to determine the accuracy of the depth and the taper angle.

The gauge center piece is ground to the proper angle of taper at (A), and shank (B) is ground to a snug sliding fit for easy operation in the body. The gauging step is ground to the tolerances required by the product. Recess (C) is bored a snug sliding fit for diameter (D), allowing sufficient clearance for the action of spring (E). The headless set screw (F) restricts the movement of the center and keeps the spring from pushing it out of the gauge body when the gauge is in a normal position.

In use the center is placed into the taper on the work and the body of the gauge pushed forward until face (G) makes contact with the part. When the center is in position the gauging step indicates whether the taper is within tolerances. If both steps are beyond face (H) the taper has been cut too small; if they are both inside the bore the taper has been cut too large. Any position between the two is within tolerances. •

1. Center angle gauge.



"RODGERS PLATEN PRESS GIVES US

FAST CYCLING WITH COMPLETE SAFETY"

—SAYS VEIT AND YOUNG

Rodgers 400-ton platen press in use at Veit and Young, Huntingdon Valley, Pa., metalworking specialists. The press is equipped with die cushion, fast cycling cylinders and other accessories. Some of the products formed are stacked by the press.

Production has been increased in drawing and forming large serving trays and electrical panels by Veit and Young with their Rodgers Platen Press. Safety controls permit operators to concentrate on speed and accuracy. They are working type 303 stainless steel, brass, carbon steel, aluminum—from 1/2" to 1/8" thick with bends up to 90°.

Auxiliary cylinders lower and raise platen quickly for fast cycling. Forming pressures are preset from 80 to 400 tons—die cushion up to 50 tons. Simple, fast adjustments govern all platen, pressure and time cycles. If you work in metal, plastic, rubber, veneers—you can mold, draw, form—*faster* with a Rodgers Platen Press. Capacities 10 to 600 tons. Send for Rodgers "Blue Ribbon" Platen Press Catalog.

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Circle No. 318 on Card, Opposite Page 65

continued

Free-swiveling Mandrel Quickly Made

Tube-benders at Temco Aircraft Corporation are using a ball-type mandrel that costs less, sets up more quickly and forms more efficiently than conventional tools of this type.

A requirement for forming tight radius bends in 2- and 3-inch OD aluminum tubing led to the development of the new tool. Temco first tried bending the tubing with a straight plug-type mandrel, but this left the tubing unsupported at the bend, and it tended to flatten. Twenty per cent of parts made this way were rejected.

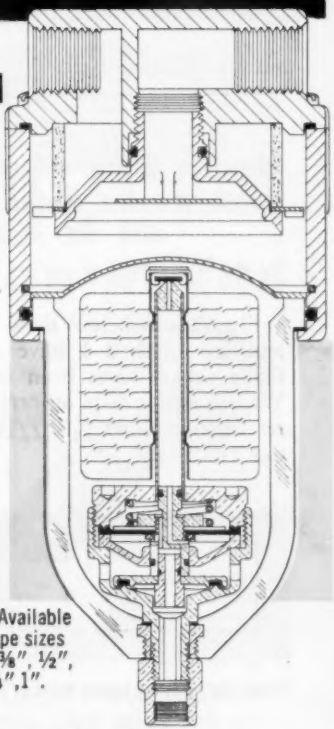
Inexpensive ball-type mandrel developed for tight-radius bends. Four mandrels have been manufactured at a cost of about $200 each. Set-up time has been reduced about 15%. Rejections have been negligible.

It was obvious that a ball-type mandrel was needed, but the plant had none in stock, and ordering the tool would mean a delay and an outlay of $700 to $800 per mandrel. Howard E. Harris, operator of Temco's Pines No. 4 tube-bending machine, came up with a design for immediate use.

The tool is similar to conventional ball-type mandrels; dished-out steel hemispheres are nested in series on the end of a shank, making a mandrel extension which curves in conformance with the tubing. The method of attaching spheres to shank, however, differs from conventional mandrels. Normally the spheres are attached with links which allow the device to swivel in only one direction. In this mandrel, spheres and shank are strung on a length of 3/16-inch cable. A shank-type terminal is swaged on one end of the cable, and a ball terminal is swaged on the other. Thus, the mandrel is free to swivel in any direction.

Fabrication of the mandrel was simplified by the cable design, which eliminated machined links. Four mandrels have been fabricated at a cost of about $200 each. Setup time is reduced about 15 per cent by the free-swiveling mandrel, since alignment isn't as critical as in conventional types. Further, part rejections have been negligible. The tool can be quickly adapted for different bends, by stringing more balls on a longer cable. •

How *Norgren* AUTOMATIC-DRAIN Air Line Filters REDUCE WEAR On Air-Equipment



Now Available in pipe sizes ¼", ⅜", ½", ¾", 1".

End cost of manual draining

1 Abrasive Materials Filtered

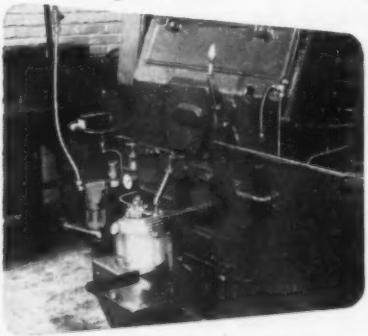
Abrasive materials such as grit, pipe scale and rust are automatically filtered from compressed air lines.

2 Corrosive Liquids Removed

An efficient baffle creates a strong centrifugal action that "wrings" oil and corrosive moisture from the air.

3 Liquids Drained Automatically

Collected liquids are automatically drained through a float-controlled, pilot-operated mechanism that discharges only when the liquid reaches a designated level, reducing air requirements, and eliminating unnecessary draining action.



Here, an automotive electrical equipment manufacturer uses Norgren MICRO-FOG to completely lubricate a ⅜" multiple spindle automatic screw machine. On this machine and on many others in the plant, a Norgren Automatic-Drain Filter protects regulator, lubricator, gears and bearings by removing abrasive solids and corrosive liquids from the air line system.

4 Drain Independent of Air Flow

As long as there is pressure on the system the drain operates around the clock, with or without air flow.

5 Choice of Filters

Standard filter is a reinforced 200 mesh Monel wire screen (74 micron). Optional filters are 64 and 25 micron sintered metal.

6 Trouble-Free Drain Operation

Solids are prevented from entering the drain mechanism to prevent clogging and assure trouble-free operation. A transparent bowl provides a clear view of liquid accumulation and the drain action.

Without obligation, learn how Norgren Automatic-Drain Air Line Filters can reduce costs in your plant. Call your nearby Norgren Representative listed in your telephone directory—or **WRITE THE FACTORY FOR THE NEW No. 700 CATALOG.**

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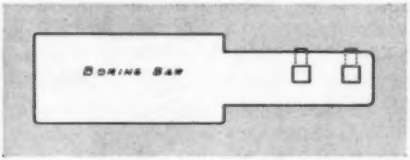
continued

Making Square Holes From Round Holes

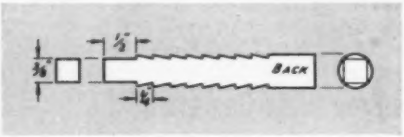
by **A. E. Salmons**

Illustrations below show boring bar and the method I have adopted to make square holes from round holes. We use boring bars on production turret lathes to hold ⅜", 7/16" and ½" tool bits.



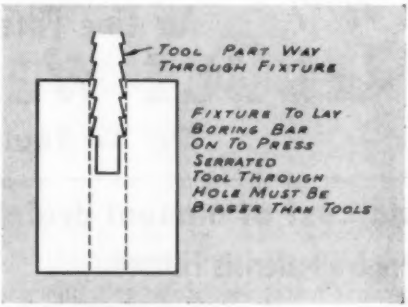
Boring Bar, showing square holes to be formed.

First drill ⅜" holes accurately in boring bar. Take four tool bits and grind the first one this way:



Broach-like serrated tool.

Note that corners are same size as drilled hole. End is flat ground to act as pilot. It is possible to hold tool straight and press through to back end on vise or hand press. The tool is serrated with a 7° clearance, the serrations graduating by degrees of .0015. Therefore, the hole is widened .003" by each serration.



Tool used in conjunction with fixture.

The pilot end of the second tool is the same size as the back end of the first tool, making it possible to hold the second tool straight and press this through, just as was done before. The same method is used with the third and fourth tools. The important thing to remember is to make the flat front end the same size as hole, and the front end of each of the other tools the same size as the back of the previous tool. If necessary, as in the case of carbon steel boring bars, make a fifth tool, taking less off with the previous four. All serrated tools can be pressed through in a few minutes, for a full seat and a clean, neat square without broken corners.

We make our boring bars from cold rolled steel. If tougher steel is used, use more tools, making each serration .001 greater than the one below, thereby removing .002" instead of .003". Serrations should be ground with a 60 grit rubber or resinoid grinding wheel and corners should be very sharp to insure free cutting. Use cutting oil on serrated tools when pressing through.

• • •

continued

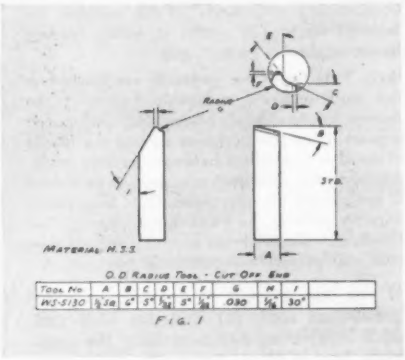
Save An Operation

by **Harold D. Rhodenbaugh**

Frequently on hand screw machines a radius on the OD of the cutoff end of a bar stock piece is called for. The general inclination in these instances seems to be to add a lathe operation to form the radius rather than incorporate it in the screw machine setup. This adds to the cost of the piece.

In most cases this added cost can be economically eliminated by designing a radius tool to work on the cutoff end. Figure 1 shows such a tool and gives a tabulation which will be handy in laying out other tools of the same design in different sizes.

1. OD radius tool—cutoff end.



O.D. Radius Tool - Cut Off End

Tool No.	A	B	C	D	E	F	G	H	I	
MS-5130	1/2	6°	5°	3/64	5°	1/16	.030	5/16	30°	

Fig. 1

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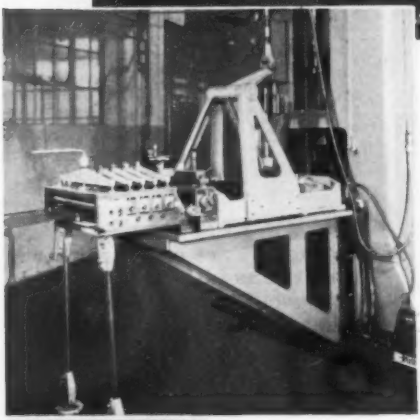

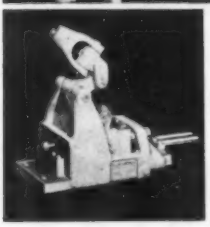

Both illustrations directly above show the SF-24-24 U. S. Slide Feed, suitable for material up to 24 inches in width, feeding length adjustable up to 24 inches, with Plain Straightener mounted on a Verson Straight Side Press. To the left is shown the smallest U. S. Slide Feed, Model SF-00, suitable for material up to 1½ inches in width, feed length up to 1 inch.

For the accurate automatic feeding of coil stock up to 24 inches in width into punch presses, there is a size Slide Feed to suit your particular requirements. The illustrations show the largest size, Model SF-24-24, suitable for material up to 24 inches in width and feeding length adjustable up to 24 inches mounted on a Straight Side Verson Press at Federal Pacific Electric Company in Newark, N. J., and the smallest U. S. Slide Feed, Model SF-00, suitable for material up to 1½ inches in width, feeding length adjustable up to 1 inch.

U. S. Slide Feeds are generally recognized as the most accurate automatic feeds on the market for the feeding of coil stock into punch presses. They are designed so that the length of feed is controlled between positive stops, providing the consistent accuracy so necessary in progressive die operations. U. S. Slide Feeds together with U. S. Stock Straighteners, Coil Cradles, and other Press Room Equipment convert your presses into automatic machines.

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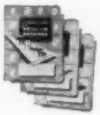

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Special Form Development

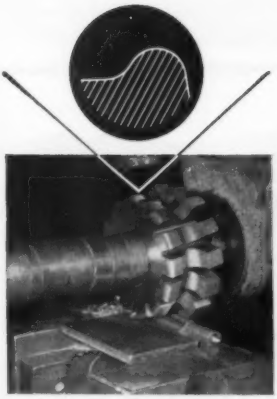
Special form-relieved cutters often allow several operations to be combined into one. Barber-Colman Engineers are experts in designing special tooth forms on form-relieved cutters for solving specific milling problems.

Our cutting tool division has the complete engineering, manufacturing and inspection facilities for making specially-designed form-relieved cutting tools of the finest quality. In addition to designing special forms, our engineers will design into the cutter such special features as axial side clearance, rake angles and helical flutes in any combination to produce maximum cutting efficiency. The best high-speed steel for the specific material to be cut is specified by our experienced engineering staff.

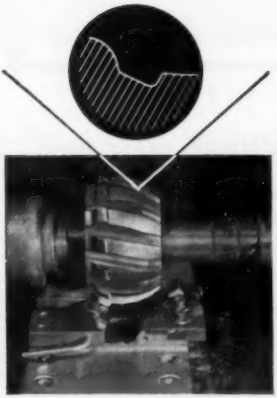
Barber-Colman form-relieved cutters require no "spot sharpening". Accurate face sharpening will maintain the correct form for the life of the cutter. This is true on all cutters including those with axial relief, rake or helical flutes.

Application of Axial Relief

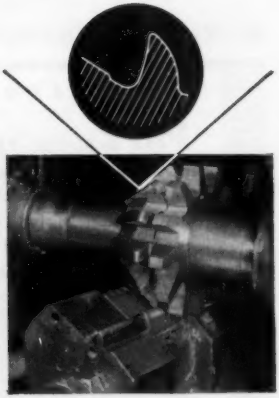
Surfaces which are in a plane perpendicular to the axis of the cutter, or nearly perpendicular, cannot be milled with a form-relieved cutter unless the cutter teeth are provided with axial side clearance. Barber-Colman can solve this problem by making the cutter with axial relief in one or both directions so that several cuts can be combined into a single milling operation. These applications show the proper use of axial clearance and helical flutes.



The form on this part has one side which is nearly perpendicular to the axis of the cutter, requiring a cutter with axial relief as well as radial relief. Both the axial and radial relief are formed onto the cutter tooth at the same time, and they are both applied to the complete tooth form. Consequently, the faces of the teeth can be sharpened without changing the tooth form. Helical flutes are provided to produce a shearing cut for improved finish and cutter life.



The form on this cutter is provided with both radial and axial relief because one small section of the form is nearly perpendicular to the cutter axis. Without axial relief, the perpendicular portion of the form would wear rapidly because of insufficient clearance. However, since the entire form has ample clearance behind the cutting edge, cutter life is greatly improved. Helical flutes eliminate any chatter during the cutting operation.



The workpiece in this application is tipped at an angle so that there is no undercut portion in relation to the axis of the cutter. However, in its cutting position, both sides of the form are nearly perpendicular to the cutter axis. The cutter is a two-piece interlocking type with axial relief in one direction on one side of the form, and in the other direction on the other side of the form. As the cutter is sharpened the form spreads apart, but the correct shape of the form is maintained. The proper dimensional relationship between the form is maintained by simply grinding the spacer between the two sections to the proper thickness.

These are only a few examples of the many special cutter problems passing through our Engineering Department daily. We welcome the opportunity to work with you in solving your production problems, and we invite you to send us part prints. Get top cutting efficiency through top cutter design.

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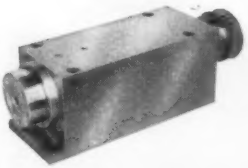

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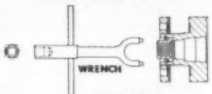

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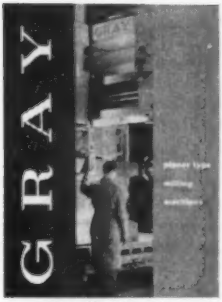

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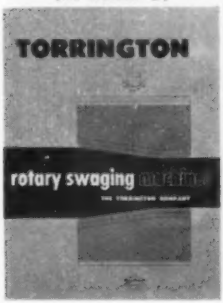


1. Milling Machines. The G. A. Gray Co., Cincinnati 7, O. Described and illustrated is the complete line of planer type milling machines complete with specifications and supplemental equipment.

2. Grinding Machines. Cincinnati Grinders, Inc., Cincinnati 9, O. Models 10" R and 14" L plain hydraulic grinding machines are described. These machines feature filmatic spindle bearings, automatic sizing, gap eliminator, and automatic wheel balancing.

3. Swaging Machines. The Torrington Co., Torrington, Conn. The Torrington line of rotary swaging machines along with an explanation of the rotary swaging process and the characteristics of swaging is presented.

4. Valves and Cylinders. The A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N.Y. The complete line of Allenair cylinders, valves, clamps and dial feed indexing tables are featured in new illustrated literature.

5. Welding. Pure Carbonic Co., Div. of Air Reduction Co., 60 E. 42nd St., New York 17, N.Y. Catalog describes the Pureco CO_2 supply systems for use in the welding industry. Information includes the gas flow obtained from each unit.

6. Tapping Head. Armite Laboratories, 6609 Broad St., Los Angeles 1, Cal. Tap-Tool, a super sensitive tapping head is described in literature. Fingertip sensitive control that results in maximum feel of the tapping operation is a fundamental feature.

7. Steel. Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa. This booklet gives details as to stainless steels, electrical materials, Carmet carbide materials, and tool steels made by the corporation.

8. Wood Products. American Woodworking Co., 1612 Lowell Ave., Chicago 39, Ill. This fully illustrated catalog presents many production phases in the manufacture of wood handles for metalworking tools. Properties of domestic woods and their uses is included.

9. Coil Handling. Automatic Feed Co., Napoleon, O. Catalog describes and illustrates the complete line of coil handling and feeding equipment along with reels, cradles, straighteners and storage ramps.

Free Literature

continued

10. Dial Indicators. The L. S. Starrett Co., Athol, Mass. Catalog describes the Starrett line of dial indicators, dial gages and instruments. It includes 140 models of different instruments.

11. Gaging Machines. Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford 1, Conn. Catalog includes the line of multi-dimension gaging machines for in-process gaging and final inspection.

12. Mining Tools. Mining Tool Div. of Kennametal Inc., Bedford, Pa. Catalog contains mining tools and bits for cutting and drilling. Also the Kennaset method of silver brazing carbide inserts into milled slots on upset drill steel is reviewed.

13. Electrolytic Shaping. Anocut Eng. Co., 631 W. Washington St., Chicago 6, Ill. Bulletin describes the process of shaping delicate honeycomb structures with ordinary grinding methods.

14. Positioning Table. Arter Grinding Machine Co., Worcester, Mass. Brochure describes and illustrates the Jigmatic, completely automatic high accuracy tape-controlled positioning table for drilling operations.

15. Burs. Atrax Co., Newington 11, Conn. A colorful wall chart, containing operating information and illustrations of more than 120 standard Atrax solid tungsten carbide burs is now available.

16. Valves. Automatic Valve Co., 37415 Grand River Ave., Farmington, Mich. New solenoid valves, to JIC specifications, 4-way-4 port, in sizes ¼", ⅜", and ½" are described in engineering bulletins.

17. V-Belt Drives. Allis-Chalmers Mfg. Co., 1007 S. 70th St., Milwaukee, Wis. The origin, history and development of the modern multiple V-belt drive is described.

18. Metal O Rings. The Advanced Products Co., P.O. Box 75, North Haven, Conn. These rings, manufactured from thin-walled tubing, provide tight, long-lasting metallic seal with low flange load.

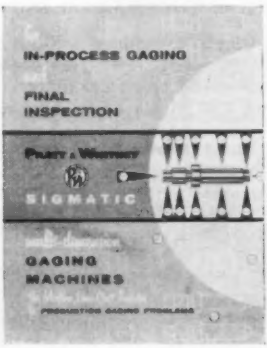
19. Drainage Fittings. American Standards Assn., 70 E. 45th St., New York 17, N.Y. This document covers all cast-brass solder-joint drainage fittings designed for use with copper water tube.

20. Concrete Gunning. Air Placement Equipment Co., 1009-11 W. 24th St., Kansas City 8, Mo. Catalog gives complete details of the line of concrete gunning equipment.

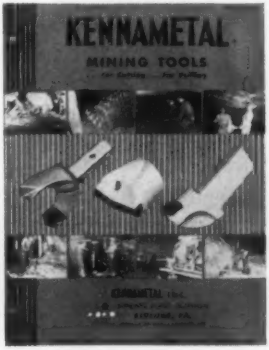
21. Abrasive Rolls. American Abrasive Products, Inc., P.O. Box 494, Dayton, O. Bulletin F-29 describes in detail the use of abrasive rolls for deburring castings, stampings, weld seams; for polishing die castings, permold, plastic, forging and glass dies.

(see Number 10.)

(see Number 11.)



(see Number 12.)



Feeling M-i-g-h-t-y Low?

IF GRINDING WHEEL PROBLEMS HAVE YOU DOWN IN THE DUMPS, DON'T MONKEY AROUND. Switch to CINCINNATI (PD)° WHEELS. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that *can save you money . . . and increase your production.*

You'll start every day with a big smile and a spring in your step when CINCINNATI (PD) WHEELS are on the job. For through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

So, let us help you see the bright side of life once more. Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION

CINCINNATI° *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

Circle No. 325 on Card, Opposite Page 65

Free Literature

continued

22. Keyway Broaching. The duMont Corp., Greenfield, Mass. Brochure describes and illustrates the Minute Man keyway broach along with broach sets, keyway bushings, arbor presses and square broaches.

23. Drill and Tap Units. The Govro-Nelson Co., 1931 Antoinette, Detroit 8, Mich. Automatic drilling and tapping units with full hydraulic control are described and illustrated.

24. Lathes. Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N.Y. The complete line of Imperial lathes is described and illustrated in the new brochure.

25. Lubricators. Bijur Lubricating Corp., 151 W. Passaic St., Rochelle Park, N.J. Detailed description and operating mechanism of pull-type semi-automatic lubricators are presented.

26. Disc Grinders. Besly-Welles Corp., Grinder Div., Beloit, Wis. Featured are double horizontal and double vertical spindle disc grinders, radial head face grinder, single vertical spindle disc grinder and many special grinders.

27. Drill Grinders. Black Diamond Saw & Machine Works, Inc., Natick, Mass. The complete line of drill grinders is described along with design features and specifications of all models.

28. Tubing. Tubular Products Div., of The Babcock & Wilcox Co., Beaver Falls, Pa. Bulletin TB-360 will acquaint the design engineer with the advantages to be gained by utilizing mechanical tubing.

29. Thru-Broached Screw. The Bristol Co., Socket Screw Div., Waterbury 20, Conn. This screw is a new version of the socket set screw and has a symmetrical socket broached through its entire length. It can be assembled and wrenched from either end.

30. Electric Ovens. Blue M Electric Co., 138th & Chatham St., Blue Island, Ill. Catalog contains electric ovens, furnaces, water and oil baths, humidity cabinets and incubators.

31. Wet Tool Grinder. J. C. Blount Co., Everett, Mass. Literature describes the model F.T.C. and the model F wet tool grinder. Both machines are designed for mass production in grinding all hard metals, special alloys, and carbide.

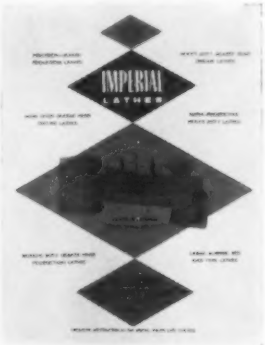
32. Spindle Repair. Bearings, Inc., 3634 Euclid Ave., Cleveland 15, 0. Literature presents a step-by-step picture story of the spindle repair service that enables spindles to be serviced or rebuilt in hours . . . not weeks.

33. Internal Grinding. Bryant Chucking Grinder Co., Springfield, Vt. Three new folders describe special Bryant equipment for internal grinding. High frequency wheelheads, automatic sizing, and the new Process Controller.

(see Number 22.)

(see Number 23.)

(see Number 24.)



BESLY Precision Tooling and Gaging Application Service

- *SAVES YOU ENGINEERING HOURS*
- *GIVES YOU HIGH PRODUCTION*
- *REDUCES YOUR COSTS*

Determining the style and type of cutting tools and gages that will do a given job best often takes engineering hours that you can ill afford to spare these days.

You can save many of these hours with Besly's Application Service. Besly Service Engineers are completely up-to-date on cutting tool and gage selection and application. They can analyze your jobs, select the right tool, and help lay out tooling set-ups to achieve longer tool life, less downtime, fewer rejects, and increased production. This service includes the development of "special" tools to fit your special needs. If you'd like proof of how it can work for you, write us.

YOU GET ASSURED COST-CUTTING QUALITY WITH BESLY CUTTING TOOLS and GAGES!

COMPLETE LINES

PRECISION ACCURACY AND QUALITY

STANDARDS AVAILABLE FROM STOCKS

FAST DELIVERY ON "SPECIALS"

BESLY TAPS

BESLY DRILLS

BESLY REAMERS and END MILLS

BESLY HIGH SPEED TOOL BITS

BESLY METRO CARBIDE TIPPED TOOLS standard and special

BESLY METRO GAGES

Engineering, Service, and "Specials" are a BESLY SPECIALTY!

BESLY

BESLY-WELLES
CORPORATION
Est. as C. H. Besly & Co. 1875
122 Dearborn Avenue, South Beloit, Illinois

Circle No. 326 on Card, Opposite Page 65

Free Literature

continued

34. Milling Machines. Maserati Corp., of America, Main St., Westbury, L.I., N.Y. The complete line of milling machines are illustrated along with design features and specifications.

35. Power Hack Saws. The Capewell Mfg. Co., Hartford 2, Conn. Booklet contains a picture story of how to use power hack saw blades, differences in blades, proper use of coolant, troubleshooting guide, etc.

36. Tool Holders. Falcon Tool Co., P.O. Box 4605 Mt. Elliott Station, Detroit 34, Mich. Catalog describes and illustrates the Falcon Kwiklok quick change holders with T.I. drive for use on boring mills, jig borers, milling machines, radials and turret lathes.

37. Machine Tool Head. Hawkeye Specialty Co., 1532 W. 14th St., Davenport, Ia. Literature describes the new concentricity head which is a precision instrument with many new engineering features.

38. Painting Machine. Conforming Matrix Corp., 394 Factories Bldg., Toledo 2, O. Literature describes an automatic oscillating gun pressure contact painting machine.

39. Threading, Chucking Machines. James Coulter Machine Co., Bridgeport, Conn. Literature describes the H1 hob threading machine, L1 automatic threading lathe, Threadmaster thread milling machine, and the T5 single spindle chucking machine.

40. Floor Drill. Cincinnati Lathe and Tool Co., Cincinnati 9, O. These 21" stationary head floor drills are supplied with power feed as standard equipment, and a sensitive hand lever and hand wheel feeds.

41. Steel. Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 22, Pa. A new base price list on stainless and heat resisting steel is available.

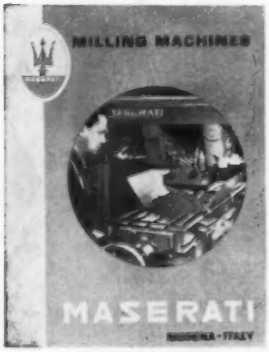
42. Surface Grinder Attachment. Cylindex, Inc., 44 Charlotte St., Binghamton, N.Y. Cylindex, a practical surface grinder attachment for precision cylindrical and indexing grinding is described.

43. Crane Electrification. Cleveland Crane & Engineering Co., Wickliffe, O. The line of Inverted-Y electrification, which is now available for application on all makes of cranes and runways is described and illustrated.

44. Hold Down Unit. D. S. O. Mfg. Co., 5 Harvard St., New Britain, Conn. Hold-All, a modern hold down unit is described and illustrated in literature, along with specifications and prices.

45. Conveyors. Industrial Filtration Co., Dept. SD-290, Lebanon, Ind. Brochure describes shuttle-drive conveyors for all material handling. Technical details are included for this oscillating conveyor.

(see Number 34.)



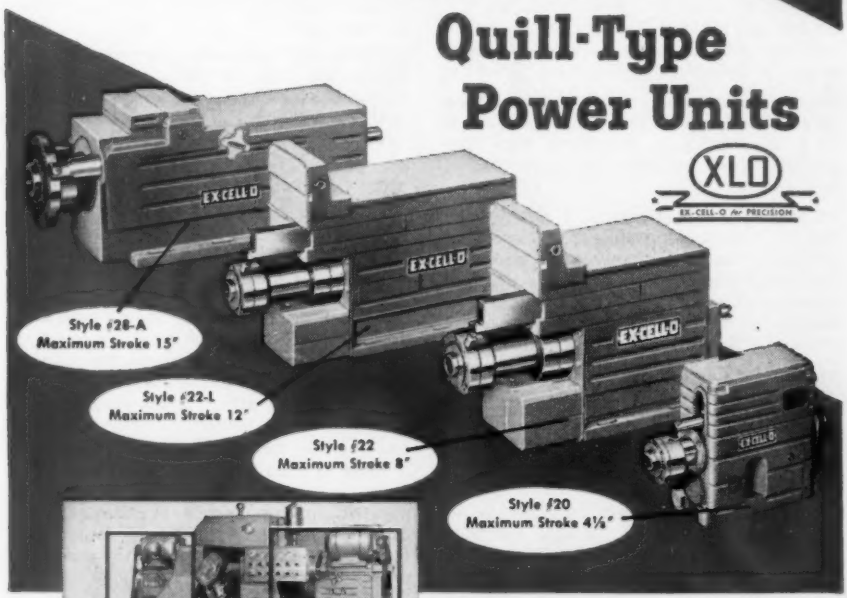
(see Number 35.)

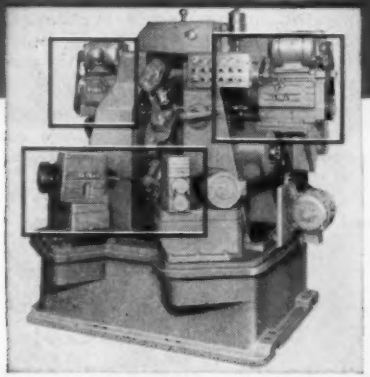
(see Number 36.)

FOR AUTOMATIC CYCLES IN PRODUCTION MACHINES:

Ex-Cell-O Quill-Type Power Units

XLO
EX-CELL-O AIR PRECISION





This special machine with automatic indexing fixture core-drills piston pin holes and drills angular oil holes. It uses six Ex-Cell-O Power Units (shown without belt guards) operated from a central push-button station.

Ex-Cell-O Hydraulic Power Units feed and rotate cutting tools in easily controlled automatic cycles. They actuate single tools or multiple spindle heads for such operations as drilling, reaming, counterboring and spot-facing. Hydraulic operation provides smooth, powerful movements.

Styles 20 and 22 Power Units can be supplied for step drilling, by means of which small, deep holes are drilled automatically in successive steps.

For complete information, including specifications and installation drawings, ask your Ex-Cell-O Representative or write Ex-Cell-O in Detroit.

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

55-14

Circle No. 327 on Card, Opposite Page 65

Free Literature

continued

46. Flame Plating. Linde Air Products Co., 30 E. 42nd St., New York 17, N.Y. Flame plating, a process of applying thin coatings of tungsten carbide on metal parts is described in a new brochure.

47. Air Hoists. The Aro Equipment Corp., Bryan, O. The complete line of air hoists and accessories is described and illustrated. Specifications are given for all equipment.

48. Metalworking Products. F. E. Anderson Oil Co., Portland, Conn. The Lusol line of water based metalworking products; improved Lusol, K-7, Shamrock, UniKool, Machine Cleaner, G-3 Germicide, rust preventive and water conditioner, are all discussed separately in brochure.

49. Rotary Lapping. Diesel Control Corp., 226 N. Marine Ave., Wilmington, Cal. The Spiralap is a rotary flat lapping machine designed to give the operator the greatest flexibility toward semi-automatic lapping flat surfaces.

50. Gages. Dearborn Gage Co., 22038 Beech St., Dearborn, Mich. Catalog contains complete specifications and prices of the entire line of gages produced to AGD standards.

51. Chuck Control. DoAll Co., Des Plaines, Ill. Brochure discusses Selectrons for effortless and automatic control of magnetic chucks. A variety of installations is pictured.

52. Measuring Tools. Ernest E. Diener Co., 4779 Korte Ave., Dearborn, Mich. Included in catalog are micrometers, bore gages, vernier calipers, height gages, protractors, dial indicators, test indicators, surface plates, parallels, etc.

53. Drill and Tap Units. Dumore Precision Tools, 1300 17th St., Racine, Wis. Catalog features automatic drill units, automatic drill heads, and small diameter drill grinder.

54. Universal Fixtures. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. How quick setups and easy change-overs are made to accommodate a wide variety of boring, turning and facing operations on standard precision boring machines is pictured in a new bulletin.

55. Indexing Turntables. Eisler Engineering Co., Inc., 750 S. 13th St., Newark 3, N.J. Catalog embodies about 150 various types of indexing turntables, rotating turntables and tables that can be set to practically any desired angle.

56. Master Spacer. Erickson Tool Co., E. 23rd & Hamilton Ave., Cleveland 14, 0. Bulletin gives detailed information on specific master spacer applications, including milling, drilling, inspection, etc. Spacer is said to index work for a variety of machining jobs.

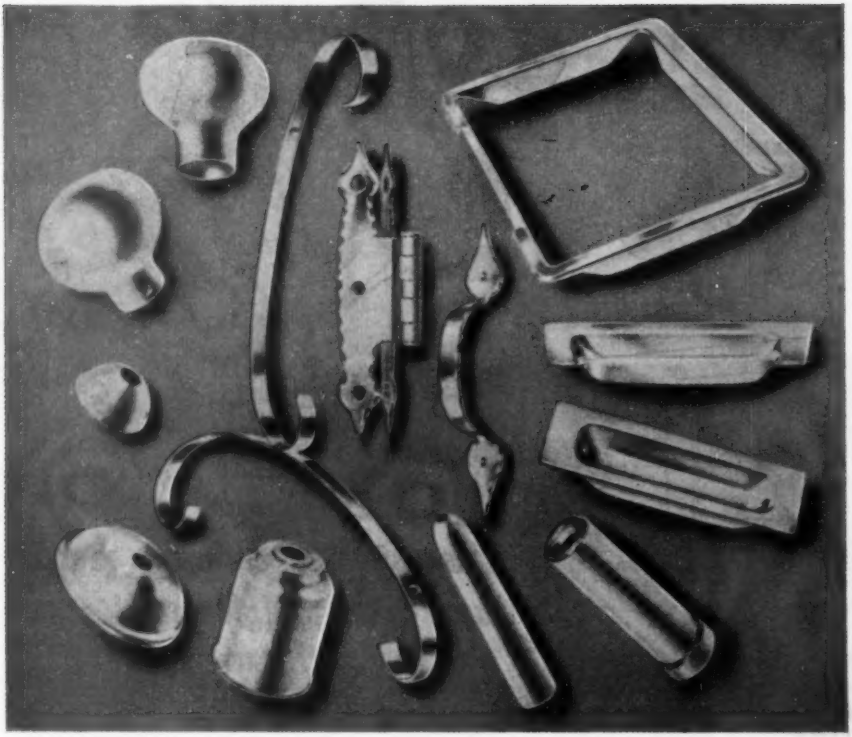
57. Miniaturization Skills. Elgin National Watch Co., Elgin, Ill. Brochure outlines company's facilities for sub-contract work in the field of miniaturization.

(see Number 46.)

(see Number 47.)

(see Number 48.)

A SHORT CUT TO A FINISHED PRODUCT



CUT POLISHING COSTS IN HALF WITH Formbrite

the new superfine-grain drawing brass with the built-in finish

The secret is in the grain: Special methods of rolling and annealing produce in Formbrite® a grain structure so fine that often a simple color buff will bring it to a bright, lustrous finish.

Formbrite is also harder, stiffer, springier and more scratch resistant—yet it is surprisingly ductile, readily stamped, formed, drawn, and embossed. And Formbrite plates beautifully.

More and more companies are using Formbrite to cut their polishing costs and get superior products—at no extra cost over ordinary drawing brass. They often save more than the cost of the metal itself.

Globe Lighting Products: Reports savings in polishing cost of from 20% to 55% in various components of their high-quality, solid brass lighting fixtures. Work pile-ups were eliminated in the polishing room, too.

Farrington Mfg. Co.: Rejects after polishing dropped from 11% to under 1% after switch to Formbrite in frames for "jewel-box" case for an electric shaver. A better finish in one faster pass through the automatic polishing machine.

Jarco Metal Products, Inc.: Polishing costs cut 40% in deep-drawn pen, pencil, and lipstick cases. Uniformity of Formbrite eliminated shutdowns for adjustments in long-run production.

Spill-Stop Mfg. Co.: Saved enough in polishing cost to avoid price increases—despite increased labor and material costs. Reports Formbrite fabricates almost as readily as the softest drawing brass . . . uniformity of gage in Formbrite has simplified manufacture.

Find out for yourself how Formbrite can serve you as a short cut—save you money. See your American Brass Company representative. Write for Publication B-39. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 4687

®Reg. U. S. Pat. Off.

Formbrite
FINE-GRAIN DRAWING BRASS
an ANACONDA® product
made by
The American Brass Company

Circle No. 328 on Card, Opposite Page 65

best on every point

... and among high speed steels the top performer is REX

To leap the hurdle of competition, a product needs performance born of quality. And Crucible's REX® high speed steel has it – in accurate size . . . sound uniform structure . . . dependable response to heat treatment . . . optimum tool performance.

Now, thanks to improved manufacturing techniques, REX is even better – more uniform. Put it to work on your next job, and you'll quickly know why REX is today, as it has always been – *the standard by which all other high speed steels are compared.*

Call for REX at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for a list of available data on REX and other Crucible *special steels,* write now for a free copy of the "Crucible Publication Catalog." *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

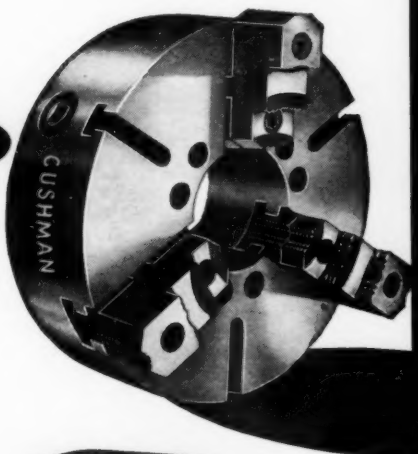
Circle No. 329 on Card, Opposite Page 65

CUSHMAN chucks

give Chuck-ability

CHUCK-ABILITY — The ability to SPEED your work . . . ELIMINATE fatigue . . . IMPROVE your products . . . and REDUCE your costs . . . through design and selection of the right work-holding devices.

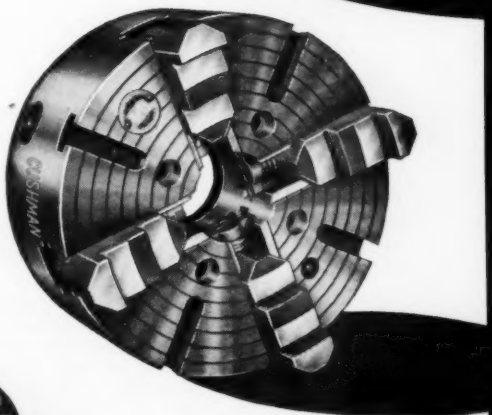
Typical Manually Operated Cushman Chuck-ability Chucks designed for Engine, Tool Room and Manufacturing Lathes.



the key to machining efficiency

If you don't hold it right, you can't machine it efficiently or economically . . . a positive truth for any chucking operation, whether it is the everyday simple routine job, or complex machining operations with many surfaces and close tolerances. Cushman Chucks give you **Chuck-ability** . . . the answer to efficient and economical machining of the new steels and alloys at high spindle speeds.

Chuck-ability is available to you in Cushman's complete line of manually and air operated precision chucks, an invaluable combination of Cushman's exceptionally broad engineering experience plus know-how of the leading chucking specialists. Write today for catalogs fully describing Cushman Chucks. Consult us on all of your work-holding problems . . . standard or special.



THE CUSHMAN CHUCK COMPANY
Hartford 2, Connecticut
a world standard for precision

CUSHMAN CHUCKS . . .
a Product of American Quality, Labor and Materials.

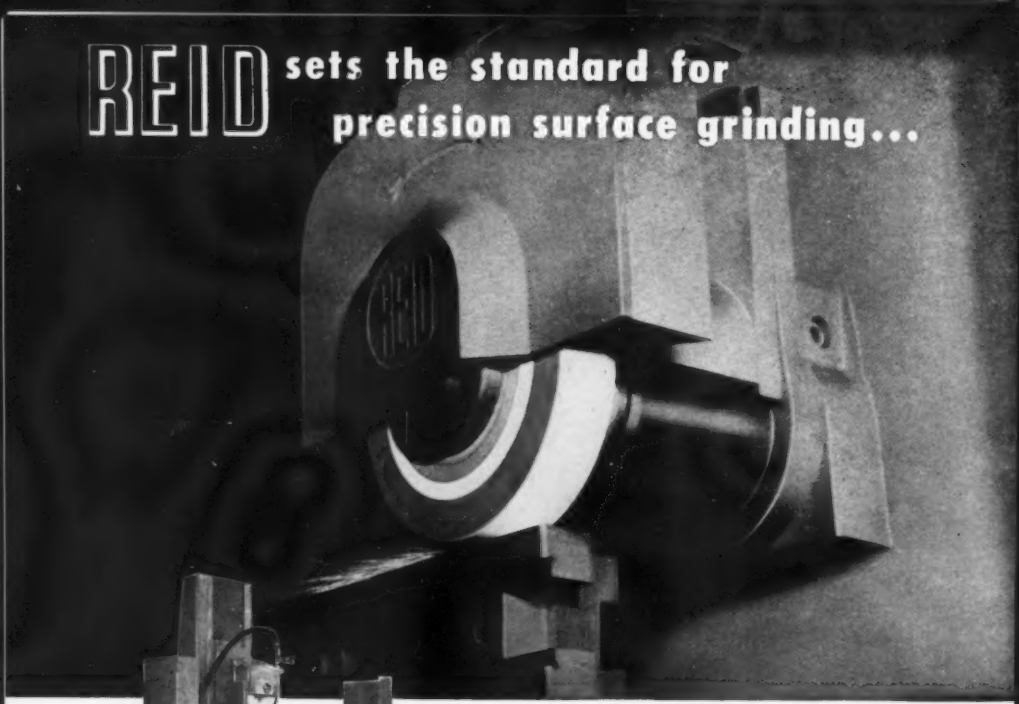
CUSHMAN CHUCKMAN CHUCKS

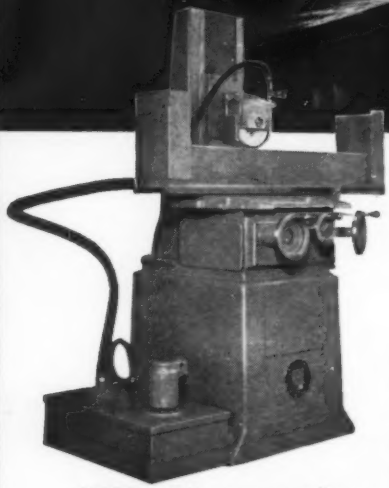
SEE YOUR INDUSTRIAL DISTRIBUTOR

manufacturers of:

Air Operated Chucks, Cylinders, and Accessory Equipment . . . The Cushman Power Wrench . . . Cushman Manually Operated Chucks and Face Plate Jaws

REID sets the standard for precision surface grinding...

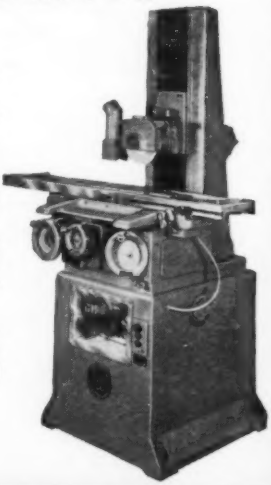




MODEL 618H convenient finger-tip level controls for all operations make this grinder the favorite of the toolroom for the finest tool and die grinding. Accessories, including Cool-Grind or wet grinding attachments, magnetic chucks and form dressers give extreme versatility for all operations.

MODEL 618VL designed for precision grinding to the finest tolerances with superior surface finish . . . rugged construction and painstaking finishing give true dependability for continuous operation with minimum maintenance. Features power feed table with traverse speed variable from 12 to 35 feet per minute.

Photo courtesy of Robertson Mfg. Co.



SPECIFICATIONS

CAPACITY: 6" wide, 18" long, 17¼" high from spindle center to table.

WORKTABLE: 51" x 8" overall.

FEED RANGE: Elevating hand wheel (r.) graduated to .0005" (optional, vernier to .0001"); cross feed to .001"; power cross feed adjustable .006" to .100" at either or both ends of table reverse.

GRINDING HEAD: with 3" opening for standard 1 h.p. cartridge type motorized spindle. Wheel size: 7" x ½" x 1¼".

FLOOR SPACE: 71" x 43½".

WEIGHT: 2100 lbs. net.

Write for Bulletin 618-6

Reid Brothers Company, Inc.

BEVERLY, MASSACHUSETTS

Check Seals for flatness....

...with VK LIGHT WAVE EQUIPMENT

Van Keuren Light Wave Equipments, standard gage laboratory equipment everywhere, have long been used for checking gage blocks, toolmaker's flats, comparator anvils and other lapped surfaces in the laboratory or inspection room. In recent years, however, VK Light Wave Equipments and flats have become valuable tools on production inspection jobs. Typical is the growing use of optical flats in checking sealing rings of various materials.

The illustration at right of a sealing ring under a 3" diameter fused quartz optical flat shows how easily measurements can be made. The ring* is acceptable on sight. The bands indicate excellent surface finish (sharp definition of bands), and no warp or low edges (uniform band spacing). Flatness is within .000005" across entire ring, and .000002" across ring face (bands curve less than ½ band interval over entire ring, and 1/6 over ring face).

*Product of Sealol Corp., Providence, R. I.

VK Optical Flat and Seal Ring

Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:

VK

37th YEAR

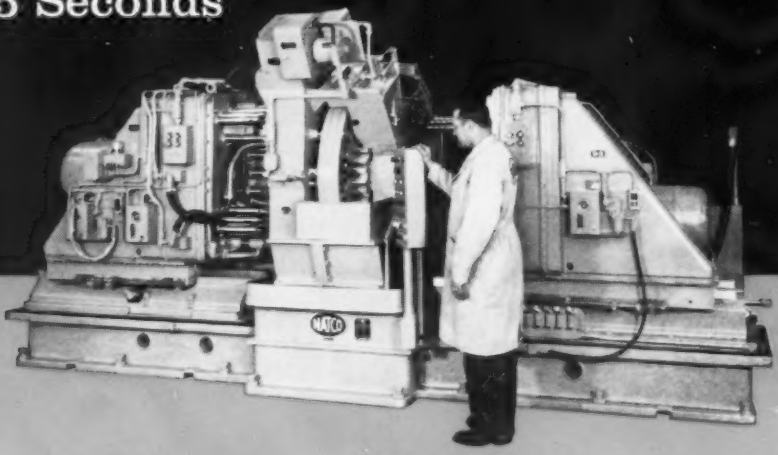
THE Van Keuren CO.,

177 WALTHAM STREET, WATERTOWN, MASS.

Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . . Gage Blocks . . . Wire Type, Taperlock and Trilock Plug Gages . . . Master Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide Plug Gages . . . Laps and Surface Plates . . . Precision Lapping Service.

Circle No. 1C on Card, Opposite Page 65

Natco HOLESTEEL® Performs 17 Operations Every 15 Seconds



Performance—this Natco 2-way horizontal drilling machine produces 250 steering knuckles per hour. Holds limits as close as .004″. Parts are clamped automatically in the interlocked trunnion fixture—spot-drilled, drilled, spotfaced, reamed and counterbored.

Features—Automatic time delay reverse, positive stop, coolant system with magnetic chip separator, automatic lubrication to heads and ways, hydraulic feed and J. I. C. compliance. Let a Natco field engineer help you with your drilling, boring, facing and tapping problems.

Ask for information about the PAYD (Pay-As-You-Depreciate) finance plan.

NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana

NATCO

Multiple-spindle drilling, boring, facing and tapping machines
Special machines for automatic production

Call Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

When a sheet metal electrode...

Has exceptionally smooth arc action... easy slag removal...

Yet operates on lower currents without sticking... with less burn through...

WHY

use anything but FLEETWELD 37 for thin gauge work

An E-6013 electrode made specially for sheet metal

FLEETWELD 37

to give you:

- Lowest burn through
- Less sticking at low currents
- Smoother corner and edge welds
- Faster operation on DC negative
- Easier operation on vertical up welds

than with conventional E-6013 electrodes

Specifications and Procedures are given in Weldirectory SB-1351. Write

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

LINCOLN... one dependable source for all your welding needs

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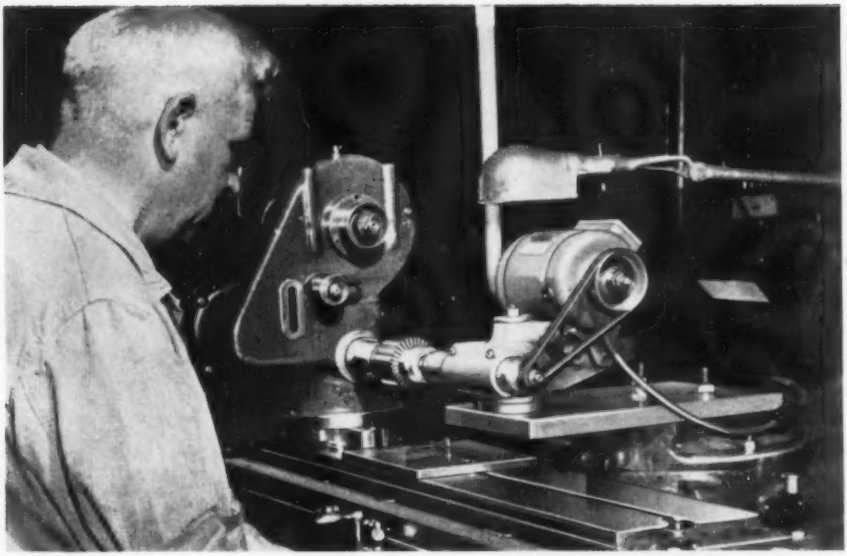
THE LINCOLN ELECTRIC COMPANY
Dept. 3608. Cleveland 17, Ohio

☐ Send me Bulletin SB-1351.
☐ Have representative call.

Company_____
Address_____
City_____ State_____
Name_____
Position_____



The Dumore unit is set up on a cylindrical grinder grinding the open jaws of the Jacobs Chucks.

Special Unit Solves Difficult Grinding Problem

● Jacobs Mfg. Co., makers of Jacobs Chucks, Hartford, Conn., has solved the difficult and costly job of grinding the open jaws of their chucks. They increased production, reduced costly spindle replacement, and improved the grinding finish on the I.D. of their plain bearing key-type drill chucks, using Dumore Series 5 Tool Post Grinder Units.

Previously bronze bearings and solid spindles made of drill rod were used for this grinding operation. Because the open jaws of the chuck necessitated an interrupted cut in grinding, these inadequate spindles lasted only three or four hours at most and often broke down in minutes. (An interrupted grinding cut transmits thousands of minute blows to the grinding wheel occasioned by the space between the jaw surfaces of the chuck. This hammering action is tough on the wheel and bearings—they break down rapidly if not made to withstand this treatment). A large number of spindles had to be maintained in the tool room to keep pace with those worn out in the grinding process. This was a costly, time consuming operation. Jacobs then installed the Dumore unit on

a Brown and Sharp Universal Grinder. These units convert the normally slow speed Universal Grinders into high speed internal grinders required for this difficult grinding operation.

Today, Jacobs uses several of these grinders, plate mounted on Universal Grinders, and operates them 100 hours a week on two shifts. They operate at the high speed of 40,000 rpm. In spite of the hammer-like blows on the grinding wheel—spindle bearings need replacement only three times a year. Besides the savings in spindle replacement and maintenance, these units produce a glass-like finish, thus eliminating additional finishing operations.

The Dumore units are made by the Dumore Co., Racine, Wis. • • •

Appointments and Promotions

Changes in Executive and Production Personnel

Name	Company	To	Position
Gordon S. Brandes	Norton Company Rocky Mountain area	Norton Company Mass. territory	Abrasive Engineer
Edwin A. Danielson	Norton Company Worcester, Mass.	Norton Company Rocky Mt. territory	Abrasive Engineer
William E. Oliver	Norton Company St. Louis, Mo.	Norton Company Grand Rapids, Mich.	Abrasive Engineer
Robert Cushman	Norton Company West Coast District	Norton Company Worcester, Mass.	Asst. Sales Manager Grinding Wheels
Harry G. Brustlin	Norton Company Los Angeles, Calif.	Norton Company West Coast District	Manager
Donald F. Jones	Norton Company Syracuse, N.Y.	Norton Company Pittsburgh, Pa.	District Manager
Charles B. Price	Norton Company Pittsburgh, Pa.	Has retired from his position as Dist. Manager	District Manager
Robert E. Peterson	Monitor Controller Co. Cambridge, Mass.	Clark Controller Co. Pittsburgh, Pa.	District Application Engineer
Kenneth Stover	Reynolds Metals Co. Louisville, Ky.	Olin Mathieson Chemical Corp. New York, N.Y.	Sales Eng., Roll Bond Dept.

Gordon S. Brandes

Edwin A. Danielson

Harry G. Brustlin

Robert Cushman

Electrical Discharge Machining

saved $448 sinking this forging die using BRASS electrodes

Conventional Method

Mill Cavity (Man and Machine)	56 hours
Hand Finish (Experienced die sinker)	52 hours
TOTAL	108 hours

ELOX method

Forge Electrode (Man and machine)	2 hours
Set up and change electrodes (man and machine)	8 hours
Machine hours only (no operator required)	32 hours
Hand finish after E.D.M.	2 hours
TOTAL	44 hours

Saved: 64 hours at $7 per hour

additional EDM advantages in forge die machining:

- Dies are fully heat treated prior to machining thus eliminating possible distortion.
- Resizing forging dies after washout can be done within two hours.
- Inherent workhardening values are retained in the dies since no additional re-heat treating is necessary.
- Actual die life is increased.
- Many forge die alloys are self-polishing after EDM.

This machining application is one of many time and material saving jobs being turned out by the standard Elox M-500 Electronic Machine Tool. See EDM in operation at Elox Demonstration Centers.

*T.M. Reg.

elox

corporation of michigan

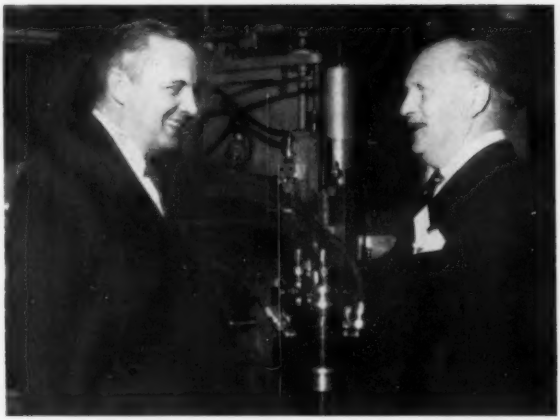
1832 Stevenson Hwy.
Royal Oak 3, Mich.

Elox Electron Drills for removing broken taps, drills, etc., from $495 to $3450.

Aviation Company Formed

The formation of a new company, Clemco Aero Products, Inc., to be housed in a new 75,000 sq. ft. plant at 210 E. Manville St., Compton, Calif., has been announced.

It will be engaged in the machining of missile fins and structural sections of aircraft, the milling of aircraft wing skins and the production of Quick Disconnect fittings for aircraft and missile pneumatic lines. Its machinery is classified as heavy industrial, with emphasis on two-dimensional and three-dimensional duplicating and profiling.



R. Glenn Gorman, left, and John D. Taylor look over machines at opening of aviation parts firm.

John D. Taylor will serve as president of the new organization. R. Glenn Gorman will be vice president and general manager.

Selas Corp. moves to suburbs

Selas Corp. of America has moved from its Philadelphia site to a new million-dollar plant in the suburbs just north of the city.

Located at the intersection of Limekiln Pike and Dreshertown Road, in Dresher, Pa., the 11-acre site, fourteen miles north of downtown Philadelphia, has been developed to provide fully coordinated facilities for all of the company's activities.

All research and development is now concentrated in one centrally located building specifically designed for intensive study of heat and fluid processing. The only exception is the ceramics laboratory, which adjoins the ceramics production area in the manufacturing building.

The manufacturing building, containing all production equipment as well as parts and raw-material storage, adjoins the laboratory. Curtain-type interior wall construction and special mounts for production machinery provide the flexibility to adapt this area to any future pattern of production requirements.

A third building houses engineering and administrative offices and such service facilities as archives, library and cafeteria.

Dr. Merchant honored twice

Dr. M. E. Merchant

Dr. M. Eugene Merchant, assistant director of research for the Cincinnati Milling Machine Co., has recently received two signal honors.

He has been appointed by the National Advisory Committee for Aeronautics to its Sub-Committee on Lubrication and Wear.

The second honor comes from France. Dr. Merchant has become a member of the International Institution for Production Engineering Research. As its name implies, this organization is devoted to the advancement, on an international scale, of production engineering and metal cutting research.

It is composed of leaders in such research from the various nations, with membership being of two classes, Titular or Associate, the latter having no vote. The membership is strictly limited, with the number of Titular members not permitted to exceed 40 and the total number of members from any one nation not permitted to exceed six. There are at present four Titular members from the U. S. A.

Overton Gear and Tool begins operations

Carl E. Overton

The newly formed Overton Gear and Tool Corp. has completed installation of equipment in its new plant in Addison, Ill., and manufacturing operations are now underway. The company will manufacture spur and helical gears, both internal and external, from any ferrous or non-ferrous metal, composition, or plastic.

Carl E. Overton, president, with 20 years continuous service in the precision gear field, was formerly chief estimator, works manager, and vice-president in charge of sales for a leading gear manufacturer. John F. Boesen, works manager, was formerly plant superintendent of hydraulic and gear assembly at Bendix Aircraft Division. Thomas Colley, production manager, was a superintendent for Continental Motors and gear field engineer.

Crosby made director Metalworking Equipt. Div.

J. P. Crosby

Joseph P. Crosby, has been appointed director of the Metalworking Equipment Div. of the Business and Defense Services Administration of the Department of Commerce. He is vice president-sales and a director of the Lapointe Machine Tool Co., Hudson, Mass.

His appointment is for a term of six months, succeeding **Ralph R. Baldenhofer,** executive vice president and treasurer of Thompson Grinder Co., Springfield, Ohio.

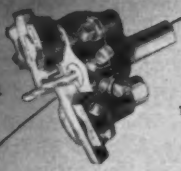
Second hydraulic forum to be held May 24, 25

The 1956 Production Machine Tool Hydraulic Forum has been scheduled for May 24 and 25 at the Engineering Society of Detroit Building in Detroit, Mich. This is the second forum for the Machine Tool Industry to be sponsored by Vickers Incorporated. Its purpose is to promote further improvement in hydraulic components and systems through an open exchange of information on current problems.

The president of the National Machine Tool Builders' Assoc., Louis F.

THE R and L LINE SAVES TIME

KNURLING TOOL



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TAP AND DIE HOLDERS

FLOATING DRILL HOLDER

UNIVERSAL TOOL POST

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Here's how R and L TOOLS pay for themselves

These tools have been described as "tools a particular machinist would design for himself". Famous throughout the world for their time and labor-saving features . . . their durability . . . their quality, R and L TOOLS are truly masterpieces of the toolmaker's art.

- Speed Set-up Time
- Speed production
- Reduce rejects to absolute minimum

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BB5-56

Circle No. 332 on Card, Opposite Page 65

Polk, will be the keynote speaker. Polk is president of The Sheffield Corp. Co-moderators for the two-day event are to be Hans Ernst, director of research at Cincinnati Milling Machine Co., and Russell L. Dustman, productive equipment manager for Chevrolet Div. of G.M.C.

One of the highlights of the meeting will be a special report by Nevin L. Bean, technical assistant to the general manager, Automatic Transmission Division, Ford Motor Co. Mr. Bean will discuss his recent visit to industrial plants in Soviet Russia, giving first-hand observations on the Soviet machine tool industry and its use of automation and hydraulics.

Taking part in the open forum discussions this year will be representatives of machine tool builders, users, hydraulic accessory manufacturers and key Vickers personnel. Attendance at the Forum is by invitation only. The agenda is prepared from questions submitted in advance by forum participants and will provide coverage of the full range of industrial hydraulics.

New York Engineering Exposition to be held May 17-19

The New York State Society of Professional Engineers will run its 30th Engineering Industries Exposition in conjunction with its annual convention on May 17, 18 and 19, at the Statler Hotel in New York City.

The Consolidated Edison Co. will exhibit a scale model of the reactor which it is constructing at Peekskill to supply atomic energy to New York City.

The Society's awards for distinguished service to the engineering profession will be given to General Omar N. Bradley and to Vincent G. Terenzio P. E. of the New York City Board of Water Supply. George Baer, of the Foster-Wheeler Corp., 165 Broadway, New York City, is the chairman of the convention committee.

Union Carbide forms development company

Union Carbide Development Co. has been formed as a new division of Union Carbide and Carbon Corp. Long-term corporate planning and evaluation of new business opportunities will be important objectives of the new company.

Birny Mason, Jr., secretary of Union Carbide, has been appointed president of the new company. **R. E. Cornwell**, **E. J. Fox**, and **J. J. Murphy** have been named vice-presidents. The new officers have been associated with the corporation for many years.

Worcester drill grinder changes ownership

The Black Diamond Saw & Machine Works, Inc., of Natick, Mass., has announced its purchase of the manufacturing and sales rights to the Worcester drill grinder, which has been manufactured since 1887 by the Washburn Shops of the Worcester Polytechnic Institute.

The grinder controls both clearance and lip angles in sharpening 2, 3, or 4-lip twist drills, flat or chucking drills, and flat twisted drills.

Borg Warner has record year

Borg-Warner reports that 1955 was the largest year in sales and in earnings before and after taxes in the history of the corporation.

Its sales volume exceeded one-half billion dollars for the first time. 1955 sales totaled $552,192,430, compared with sales of $380,317,341 in 1954—an increase of 45.2 percent.

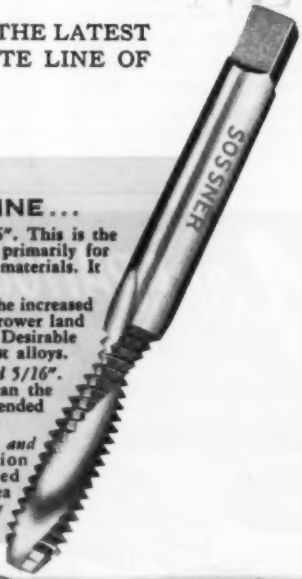
Income after taxes of $41,075,784 last year, equal to $5.17 per common share, compared with income after taxes of $24,460,075, or $3.27 per common share, in 1954. This was an increase of 67.9 percent. Earnings before taxes in 1955 amounted to $84,775,784 in comparison with $48,910,075 in 1954.

SOSSNER ANNOUNCES

"the mark of quality since 1910"

SOME NEW TAPS

WE ARE PROUD TO PRESENT THE LATEST ADDITIONS TO OUR COMPLETE LINE OF GROUND THREAD TAPS...



SPIRAL TAPS
THE MOST COMPLETE LINE...

REGULAR STYLE—#4 thru 5/16". This is the general purpose spiral fluted tap, primarily for use in blind holes in non-ferrous materials. It cuts reliably close to size.

HOOK STYLE—#4 thru 5/16". The increased hook at the cutting face and a narrower land make this style more free cutting. Desirable for bar-stock aluminum and diecast alloys.

THREE FLUTE STYLE—1/4" and 5/16". This is a stronger construction than the two flute style and is recommended primarily for steel.

DOUBLE SCOOP STYLE—1/4" and 5/16". This unique construction combines a narrow land, hooked cutting face, maximum flute area and chip-breaker effect. Specially developed for deep blind holes.

"elektra LUBE"
A PERMANENT SUPER-LUBRICANT

The elektra LUBE process imparts a thin ductile deposit which acts as a permanent super-lubricant which imbeds itself into the microscopic pores of the ground tap, resulting in a smooth burnished surface which becomes an *integral* part of the tap.

High pressures at A and B force out conventional lubricant. elektra LUBE takes over at these critical points and provides *permanent* super-lubrication.

SOSSNER TAP & TOOL CORPORATION
29 BROADWAY, LYNBROOK, L.I., N.Y.

Inquiries from representatives and distributors are invited.

Circle No. 333 on Card, Opposite Page 65

R. G. Haskins Co. buys N. A. Strand Div.

R. G. Haskins Co., manufacturer of flexible shaft grinding, polishing, and capping equipment, has announced the purchase of the N. A. Strand Division of Franklin Balmar Corp. It will be operated as a wholly owned, independently operated subsidiary, and is to be known as "N. A. Strand Flexible Shaft, Inc."

E. P. Grismer has been appointed general manager of the new division. He will continue as chairman of the board of R. G. Haskins Co.

Feedall enlarges factory

Feedall, Inc., Willoughby, O., has just completed another addition to their factory—the second within 15 months. This addition will increase their manufacturing space by about 35%.

SAVE PRODUCTION COSTS WITH . . .

quadrill

4 POSITION DRILLING & TAPPING TURRET HEAD

Holds four drills or cutting tools. One tool only operates when head is in operating position. Drills to full capacity of drill press. Send for complete information today. Be sure to specify size and make of drill press when ordering QUADRILL.

CHICAGO QUADRILL *Company*

1846 BUSSE HIGHWAY · DES PLAINES, ILL.

Circle No. 334 on Card, Opposite Page 65

Van Norman machine sales increased

Van Norman Industries, Inc., reports that the sales of Van Norman Machine Co., its subsidiary, amounted to $932,-507 for the seven weeks ended February 18, 1956, compared with $452,213 for the comparable period of the previous year.

For the same period, Van Norman Automotive Equipment Co. reported sales of $462,334 against $650,309 last year and Morse Twist Drill & Machine Co. $1,770,177 in sales compared with $1,363,562 for the preceding period.

Shipments for the machine and automotive divisions totaled $1,169,196 for the seven weeks ended February 18, 1956, compared with $1,103,833 for the same period of the past year, the company said. For Morse Twist Drill, shipments came to $1,787,206 against $1,235,-833 for the preceding period.

Stop dust quickly, at lower cost, with Dustkop. Thirty-seven standard models *ready to use* and available from stock. Dustkop conserves floor space, reduces maintenance. Collects almost all types of industrial dusts. Write for descriptive literature.

Also a complete line of Mist Collectors

AGET MANUFACTURING COMPANY
1402 East Church St. • Adrian, Michigan

Circle No. 335 on Card, Opposite Page 65

Firth Sterling increases Zirconium facilities

Firth Sterling Inc., has announced that it is substantially increasing its capacity for vacuum melting of reactor grade zirconium sponge by installing at its Trafford plant a consumable electrode furnace, melting under argon-helium gas or vacuum. The new facility will more than double present capacity and will produce up to 2000 lb. zirconium ingots.

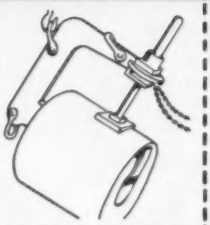
Robert A. Horner

Mr. Robert A. Horner, retired division manager of the machine and small tool division, Barber-Colman Co., passed away on February 28, at the age of 66.

Mr. Horner was with Barber-Colman for 37 years. In 1930, he became sales manager of the machine and small tool division, and he was made division manager in 1950. He retired December 31, 1955. He was a life member of the Metal Cutting Tool Institute.

Dixon ONE MAN COIL GRABS
COST LESS...increase efficiency & safety

Coil Grab—up to 5,000 lbs. cap., 1" to 24" widths



Coil Handler—up to 35,000 lbs. cap., 18" to 48" widths

Coil Hook—up to 1,000 lbs. cap., ¼" to 6" widths

Model No.	Max. Coil Wgt. - Cap.	Width Stock Handled		Radial Cap. Stock Hldd.	
		Min.	Max.	Min.	Max.
COIL GRAB					
A-10	1,000 lbs.	1"	4"	3½"	13"
A-20	2,000 lbs.	2½"	9"	3½"	12"
A-35	3,500 lbs.	7"	16"	4"	12"
A-50-12	5,000 lbs.	4"	12"	7"	24"
A-50-24	5,000 lbs.	10"	24"	4"	10"
COIL HANDLER					
M-30	15,000 lbs.	18"	30"	8"	16"
M-36	15,000 lbs.	24"	36"	8"	16"
M-48	15,000 lbs.	24"	48"	8"	16"
COIL HOOK					
H-10-6	1,000 lbs.	¼"	6"	1"	13"

Dixon *Write* for FREE Literature
AUTOMATIC TOOL, Inc.
2300 23rd AVE. • ROCKFORD, ILLINOIS

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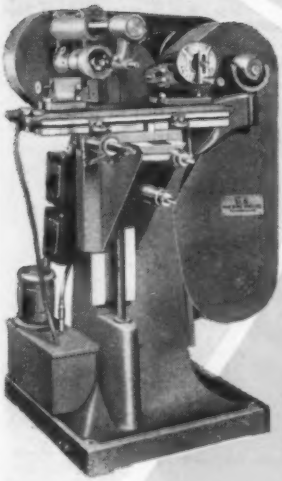
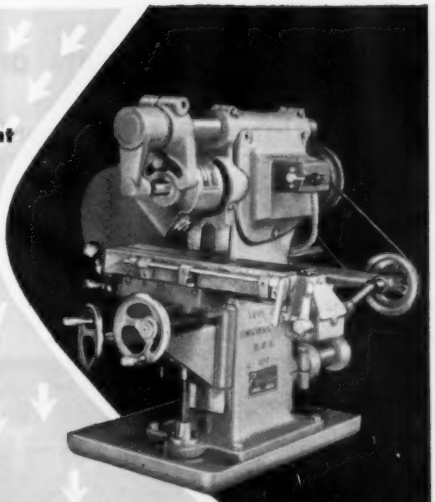
Small parts bottlenecks strangling your milling department ?





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Free Big Mills for Big Jobs!

No. 1 U. S. MILLING MACHINE

The top-quality precision mill, economically priced! May be hand operated, or equipped with air-hydraulic feeds for high production applications.

This accurate and simple-to-operate mill brings small part production into balance, with low-cost operation that avoids wasted time and investment in big mills.

Excellent for keyways, quantity runs of small pieces, such as sectors, short racks, simple profiling, sawing, slotting, squaring, cut-off, short-run splining, even light slab milling.

BURKE BENCH MILLERS

Here's small part milling accuracy for either toolroom or production uses. Choose between 2 hand and 2 power feed models.

Rugged frame, hand scraped thruout, Timken bearings . . . in a time-tested design that provides accurate milling, drilling, sawing, boring, facing and slotting of small parts.

Wide range of speeds handles any material. Dependable performance and ease of set-up lower operational costs on all types of small parts. Vertical Milling Attachment and complete range of other accessories available.

Write for complete specifications and prices

U·S·Burke MACHINE TOOL DIVISION
1 Brotherton Road • Cincinnati 27, Ohio

Manufacturers of the U. S. Vertical Milling Machine and the radically new U. S. Quartet

Circle No. 337 on Card, Opposite Page 65

Appointments and Promotions

Changes in Executive and Production Personnel

Name	Company	To	Position
Sidney J. Barber	E. F. Houghton & Co. Philadelphia, Pa.	Same	Mgr., Metalworking Products Dept.
Claude G. Wall	E. F. Houghton & Co. Philadelphia, Pa.	Same	Supervisor, Metalworking Research
Thomas J. Fell	Kennametal Inc. Detroit, Mich.	Same	Asst. Superintendent
Robert J. Roddy	Kennametal Inc. Latrobe, Pa.	Kennametal Inc. Detroit, Mich.	Office Manager
Omer W. Nichols	Westinghouse Electric Corp. Pittsburgh, Pa.	Kennametal Inc. Latrobe, Pa.	Project Engineer
Karl G. Niskanen	Pratt and Whitney Aircraft Div., United Aircraft Corp. East Hartford, Conn.	Kennametal Inc. Latrobe, Pa.	Asst. Process Engineer
Paul R. Reaver	Parker Sweeper Co. Springfield, O.	Same	Plant Superintendent
Harry E. Stanfield	Dahlstrom Machine Works, Inc. Chicago, Ill.	Same	Vice-Pres., Asst. Gen. Mgr.
George E. Powell	Fansteel Metallurgical Corp. North Chicago, Ill.	Same	Purchasing Agent
Howard U. Herrick	E. W. Bliss Co. Canton, O.	Same	Chairman of the Board
Robert Potter	E. W. Bliss Co. Canton, O.	Same	President, Director, Member of Exec. Comm.
J. H. Tredinnick	E. W. Bliss Co. Canton, O.	Same	Vice-President
William F. Fritz	Acme Machine Tool Co.	Boye & Emmes Machine Tool Co. Cincinnati, O.	Plant Superintendent
Philip B. Dellisante	Corning Glass Works, Electrical Prod. Div. Corning, N.Y.	Corning Glass Works Refractories Div. Corning, N.Y.	Controller
James F. O'Donnell	Geddard & Goddard Co. Detroit, Mich.	Same	Production Mgr.
Harold Thom	Geddard & Goddard Co. Detroit, Mich.	Same	Factory Supt.
R. B. Heppenstall	Heppenstall Co. Pittsburgh, Pa.	Same	Chairman, Board of Directors
John P. Roche	Heppenstall Co. Pittsburgh, Pa.	Same	President
J. A. Succop	Heppenstall Co. Pittsburgh, Pa.	Same	Vice-Pres., Metallurgy
Edwin Trembath	Heppenstall Co. Pittsburgh, Pa.	Same	Treasurer
R. L. Ritenbaugh	Heppenstall Co. Pittsburgh, Pa.	Same	Secretary
Joseph L. Knopf	Morey Machinery Co., Inc. New York, N.Y.	Same	Vice-President
Donald M. Pattison	Motch & Merryweather Machinery Co. Cleveland, O.	Same	Vice-President
Lawrence Fleming	Diamond Ordnance Fuze Lab.	National Bureau of Standards, U.S. Department of Commerce Washington, D.C.	Member of Mech. Instr. Section
Dr. Zoltan Bay	George Washington University Washington, D.C.	National Bureau of Standards, U.S. Department of Commerce Washington, D.C.	Member, X-ray Section
J. Grant Macdonnell	Northrop Aircraft, Inc. Hawthorne, Calif.	Same	Asst. to President
Irving Roth	Department of Defense	Northrop Aircraft, Inc. Hawthorne, Calif.	Staff Asst. to Pres.

Paul E. Reaver

Howard U. Herrick

Robert Potter

R. B. Heppenstall

STEEL
Stanho
PRODUCTS
Taper Pins
made solid for
✓ STRENGTH
✓ SAFETY
✓ ACCURACY
Stocked in all sizes #7/0 thru #14.
Special diameter sizes made to order
"Stanho" makes a complete line of SOLID Taper Pins, Straight Pins, quality Cotter Pins, Woodruff Keys, Machine Keys and special parts to order.
Write for catalog and prices
JM-7
Proven Durability plus Precision and Economy... Clean Bright Finish
"Stanho" Taper Pins are made from selected steel bars, microscopically free from any defects. Milled or centerless ground precision types. Also available made from Stainless Steel, Monel, Brass, Aluminum or other metals to your specifications.
Prompt shipments . . . in bulk or conveniently packaged.
STANDARD
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HORSE NAIL CORP.
NEW BRIGHTON, PA.

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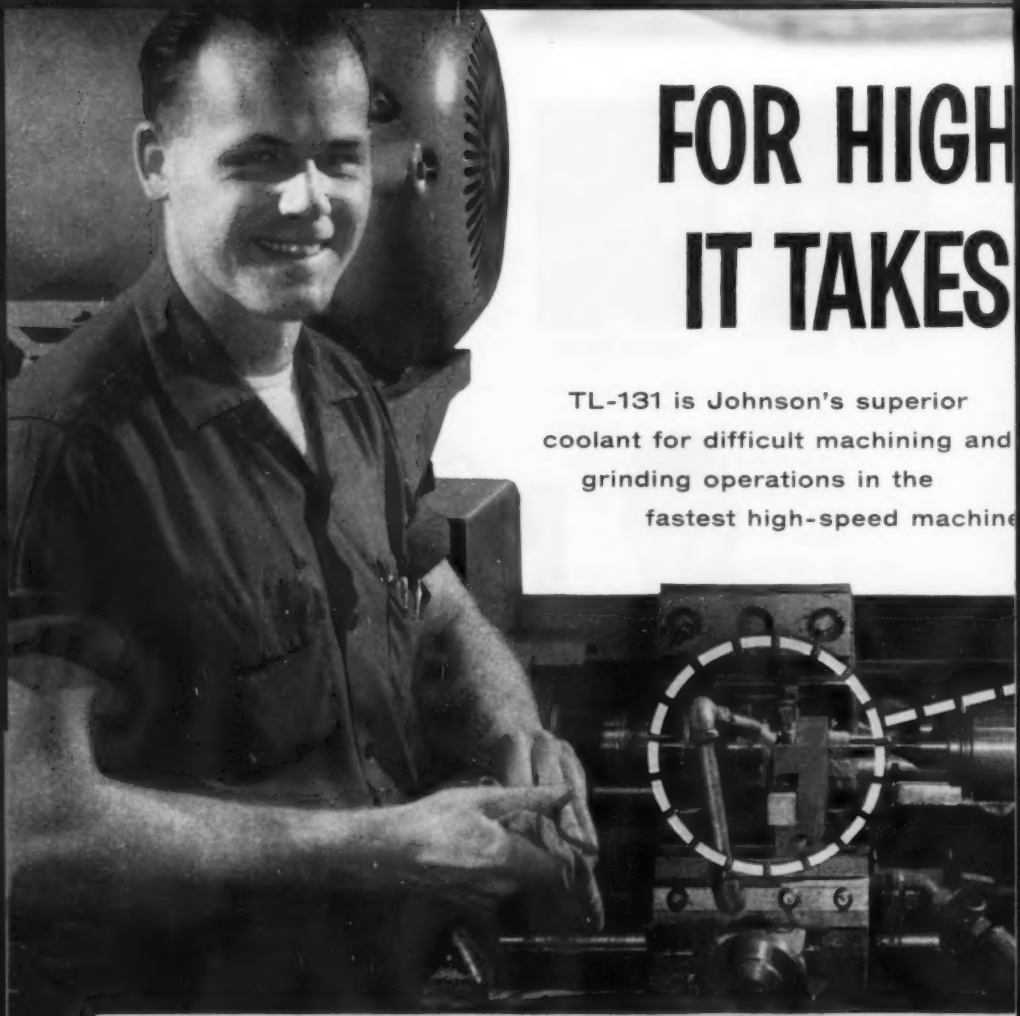
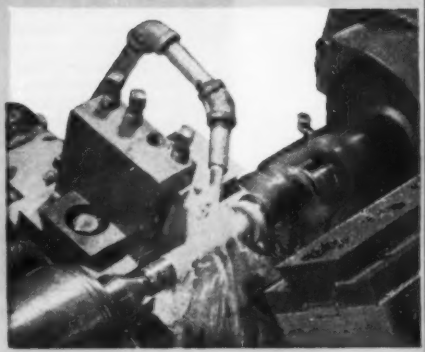


FOR HIGH
IT TAKES

TL-131 is Johnson's superior coolant for difficult machining and grinding operations in the fastest high-speed machine

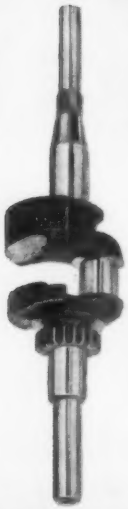
JOHNSON'S TL-131 was especially designed for cutting and grinding hard steels and for high-speed machining. Its extremely high rate of heat removal permits increased feeds and speeds impossible with conventional coolants. By preventing accumulation of destructive heat, you will find Johnson's gives you greater production, less costly downtime, longer tool life and greatly improved finishes. Also, TL-131's resistance to bacteria is liked by operators.

Illustrated is a Fay Automatic with a close-up of a Johnson Coolant in action. In both machining and grinding operations on the production line, Johnson's is used. This small engine crankshaft is high-carbon cast steel (40R), finished to .0004.



-SPEED MACHINING
JOHNSON'S WAX TL-131

Superior Performance Guaranteed



*TL-131, and all Johnson's Coolants and Cutting Fluids, are sold with a written money-back guarantee. You'll get longer tool life, increased feeds and speeds in most machines, and less costly downtime.

TL-131 J-CUT J-COOL

Johnson's Wax Products produce results as claimed or the full purchase price will be refunded. For a test run, contact your local Johnson's Wax Industrial Distributor. For his name write: S. C. JOHNSON & SON, INC., Industrial Products Department, Racine, Wisconsin.

PRODUCTS OF
JOHNSON'S WAX

John P. Roche

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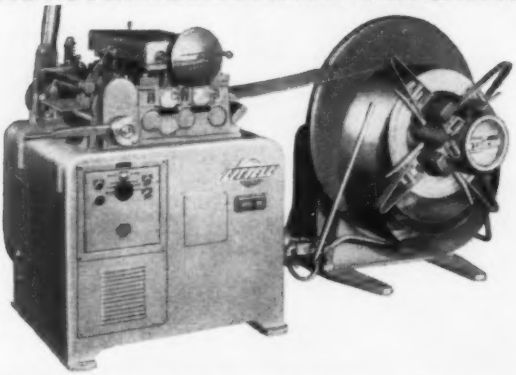
Speed Stamping Output with...

LITTELL

HYDRAULIC DRIVEN FEEDING AND STRAIGHTENING MACHINES



Smooth, powerful Littell No. 4 Series Rack and Pinion machines straighten coil stock up to .125" thick and feed it automatically to any type of punch press or square shear. They feed up to 16" lengths at standard speed, 40 SPM. Set in double cycle, they feed up to 32" lengths at 20 SPM. Used primarily in single station blanking or compound blanking and drawing operations. Also feed to multi-station dies where the final station location is by solid or disappearing stop. Easily moved about by fork truck. Write for Descriptive Bulletin B-10.

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Speed with Safety

ROLL FEEDS • COIL CRADLES
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland

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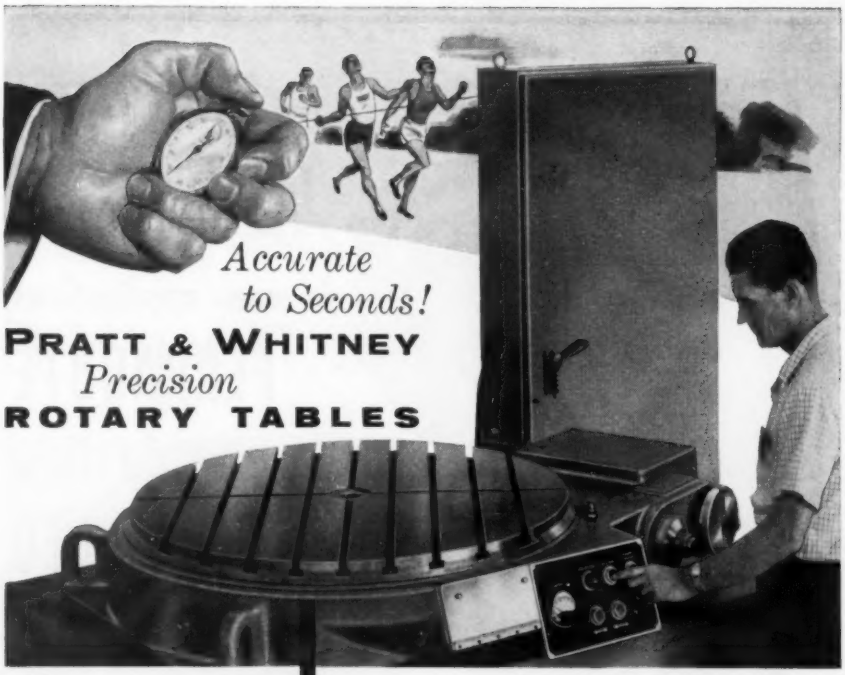

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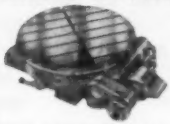
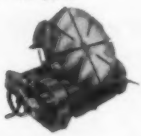
PRATT & WHITNEY *Precision* ROTARY TABLES

3 BASIC TYPES



PLAIN
Hand: 12" and 20" dia. Motor-Driven: 24" to 50".



TILTING
10" to 36" dia.

VERTICAL
Motor-Driven: 30" and 48" dia.

Like the timer's stop watch, Pratt & Whitney Rotary Tables are *accurate to seconds* . . . seconds of arc, that is! Built for ruggedness and stamina as well, they'll help you eliminate expensive jigs and set-up changes on difficult, precise machining jobs year after year. Ideal, too, for reliable inspection and circular indexing.

Featured here is the new 42" Plain Rotary Table WITH AUTOMATIC INDEXING. Work is automatically positioned to any desired angle. Initial and repeat settings are equally accurate.

Now, Pratt & Whitney Rotary Tables can be furnished with indexing control by NUMERICAL DATA.

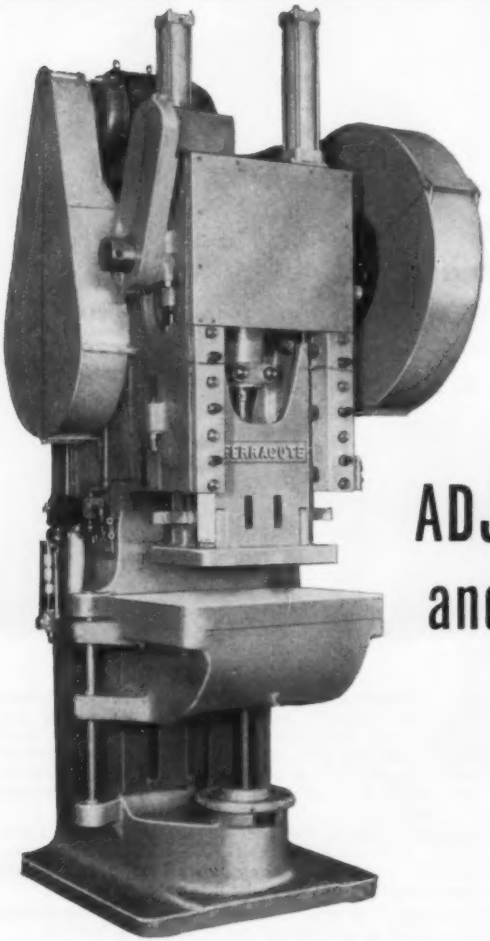
WRITE FOR COMPLETE INFORMATION
. . . ask for illustrated circulars fully describing P&W Precision Rotary Tables.

PRATT & WHITNEY COMPANY
INCORPORATED
22 Charter Oak Boulevard, West Hartford, Conn.

Direct Factory Representatives in Principal Cities

MACHINE TOOLS • GAGES • CUTTING TOOLS

Circle No. 341 on Card, Opposite Page 65



Available in 75-ton to 200-ton models

For all-around use in many applications

FERRACUTE combination ADJUSTABLE BED and KNEE PRESS

Box type ram. Bar type ram knockout
Air ram counterbalance
Air friction clutch with interconnected brake. Automatic lubrication.
Adjustable, hinged bed.

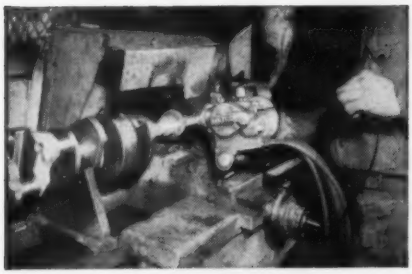
Write for complete details

FERRACUTE
SINCE 1863

FERRACUTE MACHINE COMPANY

Manufacturers of Power Presses and Special Machinery • BRIDGETON, N. J.

when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. **You haven't just salvaged a part—you've improved it.**

Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1147 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please send me Bulletin 57-C.
☐ Please have Metco Field Engineer call.

Name_____
Company_____
Street_____
City_____ Zone____ State_____

METCO

Metallizing Engineering Co., Inc.
1147 Prospect Ave., Westbury, L. I., New York · cable: METCO
In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

Circle No. 343 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Walter J. Gotstein	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Kaukauna Mach. & Foundry Div. Kaukauna, Wis.	Foundry Manager
Erwin J. Kaiser	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Davis Boring Tool Div. Fond du Lac, Wis.	General Manager
Vernon E. Unger	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Davis Boring Tool Div. Fond du Lac, Wis.	Chief Engineer
Harry E. Ankeney	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	Same	Manager-Research
Edgar L.McFerren	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L and Hypro Div., G & L Mach. Tool Co., Fond du Lac, Wis.	Vice- Pres., Gen. Mgr.
Walter B. Wigton	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L and Hypro Div., G & L Mach. Tool Co., Fond du Lac, Wis.	Chief Engineer
Harry C. Soukup	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L and Hypro Div., G & L Mach. Tool Co., Fond du Lac, Wis.	Works Manager
Jesse Daugherty	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	Same	Staff Vice-Pres., Eng.
Fred C. Freund	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	Same	Vice-Pres., Industrial Relations
Morton R. Swift	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	Same	Vice-Pres., Finance and Treas.
Allan L. McKay	Kaukauna Machine Corp. Kaukauna, Wis.	G & L Mach. Tool Co., Cincinnati Bickford Div. Cincinnati, O.	Vice- Pres., Gen. Mgr.
J. Holden McKewen	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Cincinnati Bickford Div. Cincinnati, O.	Chief Engineer
Charles L. Reichert	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Cincinnati Bickford Div. Cincinnati, O.	Works Manager
Erich C.Wussow	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Kaukauna Machine & Foundry Div. Kaukauna, Wis.	Vice-Pres., Gen. Mgr.
Everett E. Hosea	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Kaukauna Machine & Foundry Div. Kaukauna, Wis.	Chief Engineer
George E. West	Giddings & Lewis Machine Tool Co. Fond du Lac, Wis.	G & L Mach. Tool Co., Kaukauna Machine & Foundry Div. Kaukauna, Wis.	Machine Shop Manager
C. Neil Norgren	C. A. Norgren Co. Englewood, Colo.	National Council of Profit Sharing Industries Manufacturers Association of Colorado	First Vice-President Vice-President
Lebbeus S. Case	Reed-Prentice Corp. Worcester, Mass.	Same	Production Planning Manager
Lawrence A. Franks	Reed-Prentice Corp. Worcester, Mass.	Same	Purchasing Agent
William D. Gilder	Weatherford Co. Cleveland, Ohio	Reed Roller Bit Co. Houston, Texas	Chief Metallurgist
Jesse A. Giles	A. Schrader's Son Toronto, Canada	Same	Manager of the Toronto Plant
Donald H. Storey	A. Schrader's Son Toronto, Canada	Same	Asst. Manager of the Tire and Valve Mfg. Plant
Joseph Sawitzke	Hendey Machine Co. Torrington, Conn.	Seneca Falls Machine Co. Seneca Falls, N.Y.	Manufacturing Engineer
Edwin R. Smith, Jr.	Seneca Falls Machine Co. Seneca Falls, N. Y.	Same	Executive Vice-President and General Manager
Russell M. Wheeler	Seneca Falls Machine Co. Seneca Falls, N. Y.	Same	Chief Engineer

Erwin J. Kaiser

Edgar L. McFerren

Allan L. McKay

Erich C. Wussow

Heads...You Win!

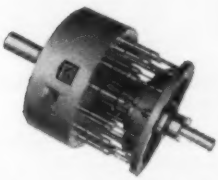
U. S. DRILL HEADS, THAT IS!

For automatic setup.

Regardless of the size of your shop, if you have high production jobs, you'll find an extraordinary reduction in tooling and manufacturing costs when you use U. S. Drill Heads.

The heads shown here, moderate in cost, are for use with automatic chucking machines and turret lathes, for drilling or tapping operations. They provide, in most cases, that a part can be completely finished in one handling.

For semi-automatic setup.



For semi-automatic setup.

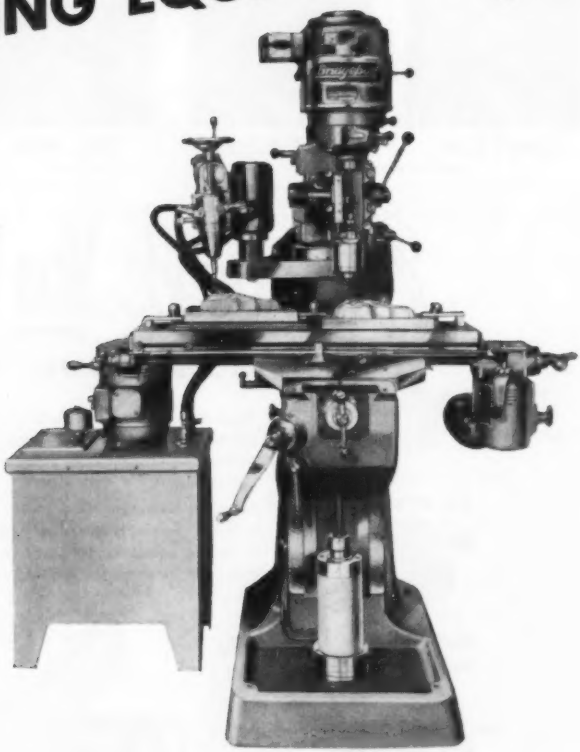
Manufacturers of all types of adjustable, fixed center and individual lead screw tapping heads.

US DRILL HEAD — THE UNITED STATES DRILL HEAD COMPANY

616-618 Burns Street, Cincinnati 4, Ohio

Circle No. 344 on Card, Opposite Page 65

Do you need COPYING EQUIPMENT?



Full details on request.

The Bridgeport True Trace combination will give excellent performance and save endless hours when copying irregular dies and moulds.

The stylus mounting fits between the column and the turret and is suitable for either right hand or left hand installation on new or old machines.

The stylus assembly swings out of the way so there is no interference when machine is used for conventional milling.

Bridgeport MACHINES, INC.

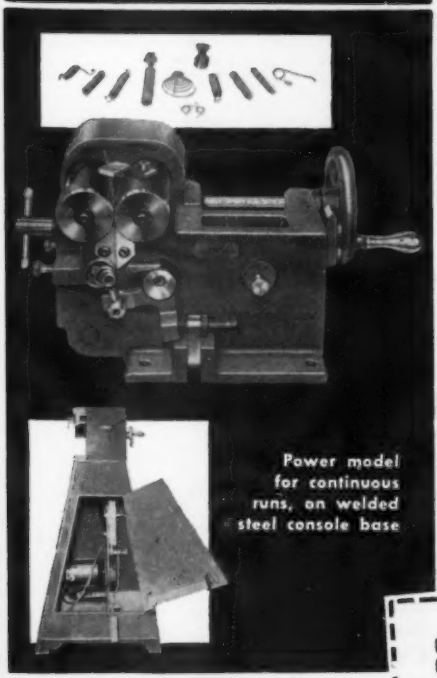
Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

Circle No. 345 on Card, Opposite Page 65

Hold any machine work at any EXACT angle with sturdy OMNI-VISE!

Accurately set in all three planes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only 7" high (lowest in the trade), **OMNI-VISE** #4, shown at top, is tough, weighs 74 lbs. Jaws are 4" x 1½", open to 4". Base is 9" in diameter with one side straight. Inset shows **OMNI-VISE** #2, a precision low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height, 4¾". Jaws, 2⅛". Opening, 2⅛". Base, 7¼" x 5". For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.



Make any type spring, without arbors, FAST with Perkins Spring Coiler!

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of arbors, yet turn out precision springs — torsion, compression, extension tapered, or special springs — coiled either left or right hand, in any desired length, any diameter from 1/16" to 12" and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. Make them fast right in your own shop!

EXCLUSIVE DISTRIBUTORS OF PRECISION MACHINE TOOLS

Connors and Davis Sales Corporation

CONNORS AND DAVIS Sales Corp.
605 Circuit Ave., West Springfield, Mass.

Please send detailed information and prices on:

PERKINS SPRING COILER hand ☐ power ☐

OMNI-VISE #4 ☐ #2 ☐

Name_____ Title_____

Company_____

Address_____

City_____ State_____

Circle No. 346 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
William R. Moore	Norton Company Worcester, Mass.		Has retired from his position as Vice-President
Edwin C. Evans	Norton Company Worcester, Mass.	Same	Director
Howard J. Daly	Norton Company Worcester, Mass.	Same	Vice-Pres., Crude Abrasive Plants
William H. Perks	Norton Company Worcester, Mass.	Same	Asst. Treasurer
Curtis M. Clark	Norton Company Worcester, Mass.	Same	Asst. Secy.

Speed Secondary Finishing with

SCHAUER SPEED LATHES

Polishing shaft bearing surface with Schauer Type NA2C Speed Lathe.

These versatile, low-cost machines handle an almost unlimited variety of work — deburring, lapping, trimming, polishing—on metal and plastic parts. Thousands in use. Many sizes and models with holding devices to suit the job. *Speed production* with Schauer Speed Lathes. Write for Catalog No. 530.

SCHAUER MANUFACTURING CORP.

4502 Alpine Ave. • Cincinnati 36, Ohio

Circle No. 347 on Card, Opposite Page 65

William R. Moore

Edwin C. Evans

William H. Perks

Curtis M. Clark

Storming down the runway at a take-off speed of approx. 120 m. p. h., an unbalanced jet-aircraft wheel can get real jittery with vibration. Some aircraft manufacturers balance jet wheels on a Bear Dy-Namic Balancing Machine to avoid the dangers and wear-and-tear caused by such vibration. The great versatility of this machine, which quickly adapts itself to parts of different size and weight, has made balancing a regular part of manufacture.

FREE CATALOG includes latest technological data!

If you're troubled with "jitters" in rotating parts, it will pay you to look into Dy-Namic Balancing as a means to eliminate noise and vibration, prolong life and cut bearing wear. You'll find this 24-page book a big help in getting acquainted with the latest advancements in Dy-Namic Balancing and how you can best employ them in your operation. For your free copy, write Bear Mfg. Co., Dept M-20 Rock Island, Illinois.

1280

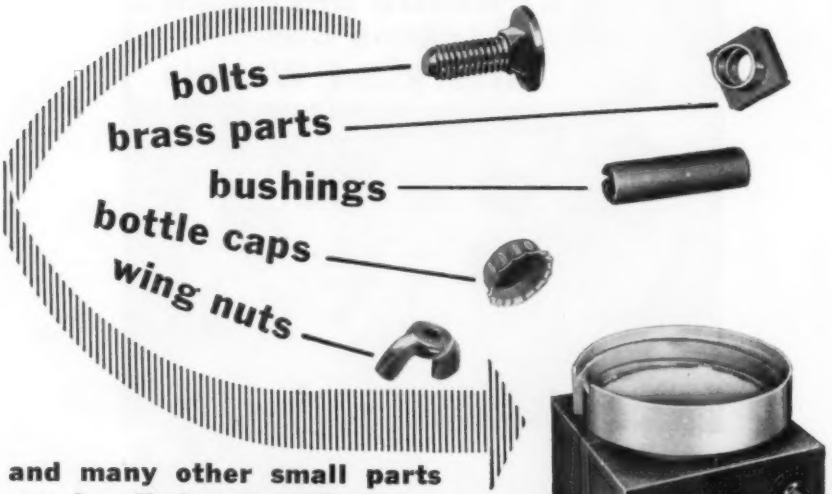
BEAR

STATIC AND *DY-NAMIC BALANCING* MACHINES

Circle No. 348 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Edwin J. Merrell	Habirshaw Cable and Wire Div., Phelps Dodge Copper Products Corp. New York, N.Y.	Same	Chief Engineer
Del Mar	Habirshaw Cable and Wire Div., Phelps Dodge Copper Products Corp. New York, N.Y.		Has retired from his position as Chief Engineer
Howard Meuche	Sterling Engineering Co. Laconia, N.H.	Potter & Brumfield Princeton, Ind.	Works Manager of the Electrical Relay Mfg. Plant



and many other small parts are handled automatically with SYNTRON REG. TRADE MARK PARTS FEEDERS

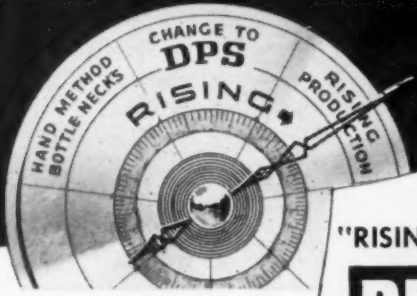
Feeding small parts of almost every shape and material—at controllable rates—single file—in oriented position—Syntron Parts Feeders provide the most efficient and economical method yet developed for full production feeding of parts in automatic processing set-ups. Electromagnetic operation—no mechanical wearing parts—easy to install.

Write for FREE Catalogue Data

SYNTRON COMPANY
300 Lexington Ave. Homer City, Pa.

Circle No. 349 on Card, Opposite Page 65

Is your production barometer up?

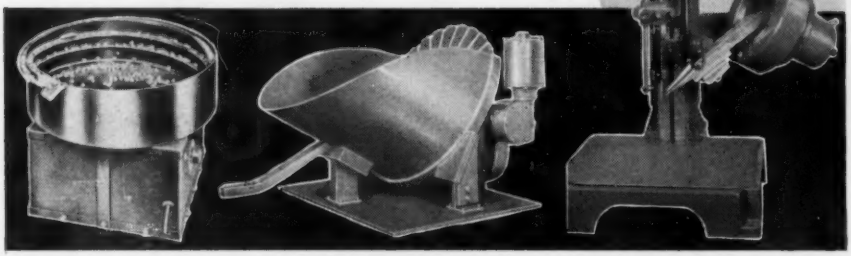


You Get a

"RISING" PERCENTAGE WITH DPS POWER DRIVEN SCREWDRIVERS and SELECTIVE PARTS FEEDERS

Widely Adaptable to Individual Requirements

● Are you using DPS Power Equipment? If not, we urge that you get full details now . . . If you have a difficult problem, don't hesitate . . . Thirty years of experience with thousands of different applications . . . will enable us to cope with it and supply you with machines engineered to fit your needs. Progress demands DPS methods . . . Necessities in modern production where speed, economy and handling at minimum cost are so important . . . We can help you . . . Write Today . . . Ask for catalog.



BOWL FEEDER, Vibratory type, to select and feed smaller, fragile parts.

BARREL FEEDER with stationary ring cover, for heavy-duty, large production runs.

5 SCREWDRIVING MACHINES, Bench and Pedestal types. Model A pictured.

DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST. DETROIT 16, MICHIGAN.

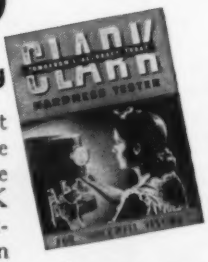
Circle No. 350 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Robert L. Chandler	Square D Company Detroit, Mich.	Square D Company Royal Oak, Mich.	Plant Manager
Carl A. Hance	R. G. Haskins Co. Chicago, Ill.	Sminkey and Co. Chicago, Ill.	Asst. Gen. Manager
Wayne L. Krause	Union Twist Drill Co. Chicago, Ill.	Sminkey and Co. Chicago, Ill.	Mgr., Cutting Tool Div.
John W. Vance	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Works Manager
Thomas Pakenham	Portland Machine Tool Works, Inc. South Portland, Me.	Same	General Manager

GET THE FACTS

About Hardness Testing



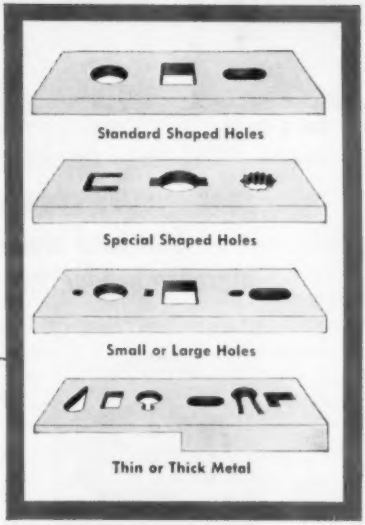
Everything you need to know about hardness testing is told in this handsome book, prepared by the makers of the internationally respected CLARK Hardness Testers for "Rockwell Testing." Simple, easy-to-read text (in English) and numerous illustrations show the equipment and procedure for fast, accurate hardness testing of ferrous and non-ferrous materials. If you would like a copy, *free of charge*, just attach this ad to your letterhead or write "Send book." A copy will be mailed to you promptly.

P.S. If you are interested in descriptions and prices for CLARK Hardness Testers (Standard and Superficial) of *guaranteed accuracy*, say the word and we'll gladly supply them.

CLARK INSTRUMENT INC.
10206 Ford Road • Dearborn, Mich., U.S.A.

Circle No. 351 on Card, Opposite Page 65

WHEN R-B Punches Are Used



What are your piercing or forming requirements—standard or unusual shapes—small or large holes—steel or special alloys—thin or thick metals? There is either an R-B punch in standard shapes and sizes or R-B will manufacture special punches, die buttons and retainers to your specifications that will provide more efficient piercing operations.

Many hole-making applications, formerly requiring drilling or some other costly means, can now be done with R-B interchangeable punches. If you have thought your piercing jobs too tough for interchangeable punches, it will pay you to investigate the wide application potential of R-B standardized equipment.

R-B Engineering Service Is Available for Your Tough Piercing Problems.

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
Dept. 73 • 12621 Burt Rd. • Detroit 23, Mich.
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COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

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SPECIAL COLD FORGED PARTS
STANDARD CAP SCREWS
PRECISION GROUND PARTS
SHEET METAL DIES MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

Circle No. 352 on Card, Opposite Page 65

Carl A. Hance

Wayne L. Krause

John W. Vance

Thomas Pakenham

Look into the complete, cost-cutting **LOVEJOY** *line. Standard tools are in stock – to help you increase production, save time and money now!*

INSERTED-TOOTH MILLING CUTTERS

Face, side, end, slotting and boring mills.

H. S. S., CARBIDE, ALLOY BLADES

Interchangeable in all Type "A" milling cutters from 4½" to 24" in diameter.

NEW! SET-SCREW TYPE END MILLS

And new Type "Z" slotting cutters provide maximum axial and radial adjustment.

Boring Tools · Arbors · Flywheels
Lovejoy Milling Cutter · Assembly Gage

Special cutters are a Lovejoy specialty

Write for new catalogs: No. 31 (Face Mills), No. 32 (Side Mills), No. 33 (Arbors).

136 MAIN ST., SPRINGFIELD, VERMONT

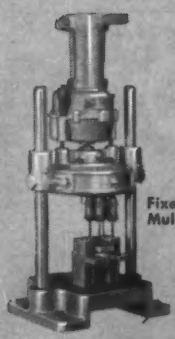
Send for free **SPEED & FEED CALCULATOR**

LOVEJOY TOOL COMPANY, INC. Ltc

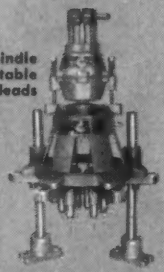
SPRINGFIELD, VERMONT, U. S. A.

Circle No. 353 on Card, Opposite Page 65

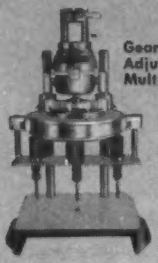
Unit engineered for greater small hole drilling and tapping production!



Fixed Spindle Multiple Heads



Flex-Shaft Spindle Adjustable Multiple Heads



Geared Spindle Adjustable Multiple Heads

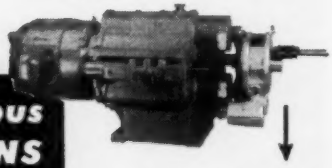
ETTCO-EMRICK MULTIPLE HEADS

BOTH the head and workholder are designed *as a unit* to your requirements to give you a *complete* high production system capable of maintaining highest production rates on your drill press. Thus, you are not only assured of drilling and tapping the maximum number of holes at each stroke but — what is just as important — the fastest handling of the parts.

SEE FOR YOURSELF. Send samples or drawings of your parts with basic production data. We'll give you recommendations and prices.

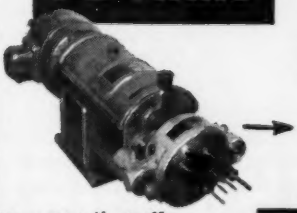
For details, ask for our Multiple Head Bulletins.

The famous T-D TWINS



Automatic Drilling Unit

Completely self-contained with exclusive features that mean better work at lower cost.



Automatic Lead Screw Tapping Unit

Used with Ettco-Emrick Multiple Heads, it's the ultimate in fast, automatic precision tapping.

"See your Authorized Ettco Distributor"

ETTCO TOOL CO., INC.
596 Johnson Ave., Brooklyn 37, N. Y.
Chicago • Detroit • Los Angeles • Indianapolis

Ettco-Emrick
the right equipment for every small hole drilling and tapping need.

Circle No. 354 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Ben H. Ward	Lees-Bradner Co. Cleveland, Ohio	Same	Manager of the Factory Division
Norman J. Hoenie	The Lincoln Electric Co. Cleveland, Ohio	Same	Chief Engineer, Machine Division
George Landis	The Lincoln Electric Co. Cleveland, Ohio	Same	Vice-President in Charge of Research
Emmett Smith	The Lincoln Electric Co. Cleveland, Ohio	Same	Chief Engineer, Electrode Div.
L. K. Stringham	The Lincoln Electric Co. Cleveland, Ohio	Same	Vice-President in Charge of Engineering

AVOID SCREW FAILURES!

Ordinary Cap Screw — Mac-it Socket Head Cap Screw

...SPECIFY MAC-IT

Screw failures are hazardous! Workmen can be injured, equipment damaged and down-time increased unnecessarily.

Mac-it Screws are protected against such failures by their "built-in" toughness—over twice the "tensile" of ordinary cap screws. This is achieved through expert heat treatment of high grade alloy steel.

Because the head will not twist off and the socket will not split, a Mac-it Screw can be driven tighter. Once the fully-formed threads take their grip, they assure stronger fastening.

Don't put up with the false economy of inferior grade screws. Specify Mac-it. Your local distributor stocks a wide variety of Mac-it screw types and sizes. Ask him for free literature and samples, or write:

Mac-it Screw Division

STRONG, CARLISLE & HAMMOND COMPANY

1392 West 3rd Street • Cleveland 13, Ohio

Circle No. 355 on Card, Opposite Page 65

W&B

DISTRIBUTORS

OF DRILLS, REAMERS AND CARBIDE TOOLS

SERVE YOU BEST!

With

A wider range of sizes and styles

Rapid off-the-shelf deliveries at lower cost

Uniform high quality for longer tool life

Sound advice in selecting the right tool

Take the first step toward increased production and lower tool costs! Contact your Whitman & Barnes distributor for complete information or write direct for free Catalog 106!

W&B *"Makers of Fine Tools Since 1848"*

WHITMAN & BARNES

40045 PLYMOUTH ROAD • PLYMOUTH, MICHIGAN

NEW YORK • CHICAGO • LOS ANGELES

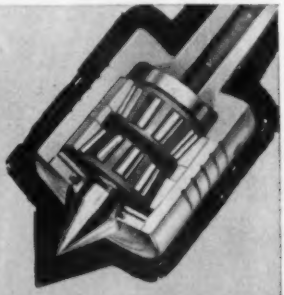
Circle No. 356 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Walter C. Bergstrom	Weldon Tool Co. Cleveland, Ohio	Same	President
Paul R. Hatch	Brown & Sharpe Mfg. Co. Providence, R. I.	Weldon Tool Co. Cleveland, Ohio	Executive Vice-President
E. C. Sedlack	Westinghouse Aviation Gas Turbin Div., Kansas City, Mo.	Same	Works Manager
S. S. Stine	Westinghouse Aviation Gas Turbine Div., Kansas City, Mo.	Same	Executive Asst. to the Division Manager

PRECISION BEARINGS

put long life in



IDEAL LIVE CENTERS

SEE YOUR DISTRIBUTOR OR MAIL COUPON

Specify IDEAL Live Centers and get custom-engineered performance from standard models. Your IDEAL distributor stocks them in a wide range of models and tapers. IDEAL Live Centers are guaranteed to match the accuracy and capacity of your lathe!

IDEAL

IDEAL INDUSTRIES, Inc. • 1441 Park Ave., Sycamore, Illinois

Kindly send us data on Ideal's complete line of LIVE CENTERS.

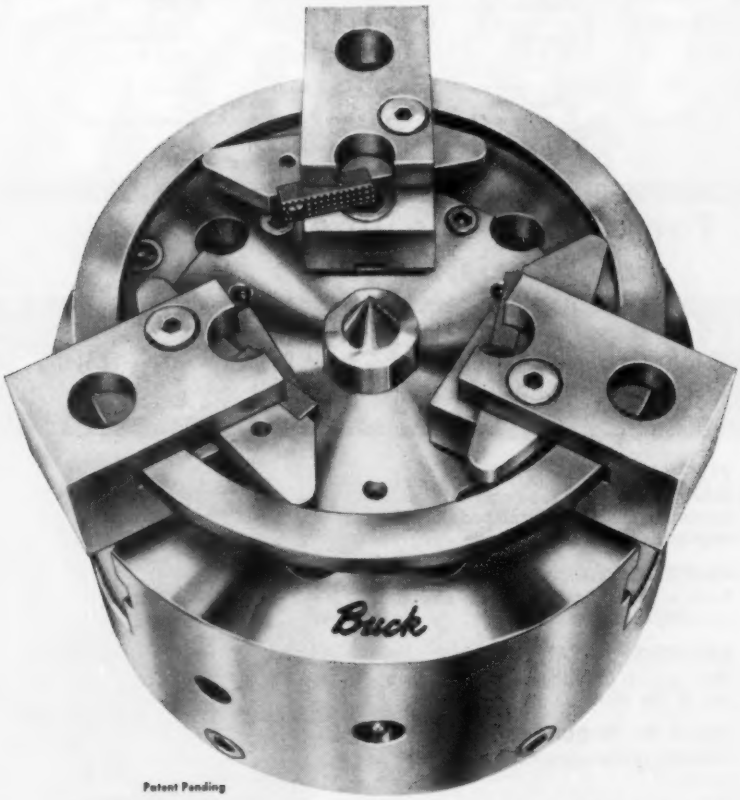
Name.....
Company.....
Address.....
City.....Zone....State.....

CANADIAN DISTRIBUTOR: Irving Smith, Ltd., Montreal

Circle No. 357 on Card, Opposite Page 65

Another *Buck* FIRST!

NEW COMPENSATING POWER CHUCK



Patent Pending

Ends the Friction that Breaks Centers and Distorts Work

This Buck development begins a new era of greater efficiency in compensating chucks.

Gone is all the friction of internal compensating mechanisms that, in the past, have often forced undue pressure on work to distort it or break centers.

The Buck compensating mechanism is all outside of the chuck body. As jaws move in on work, one jaw pad always makes first contact. This instantly swings its rocker arm to the controlling ring, which in turn brings the other jaws up to contact—with minimum pressure on the work.

The Buck operates equally well with the machine running or not—allows automatic loading and unloading. And its compensating mechanism increases gripping power to permit more rapid stock removal.

Since this is a Buck, the patented Buck Ajust-Tru principle can be used to position the center absolutely dead true. Work-holding diameters can be changed, within practical limits, by replacing jaw pads.

This is also a dual-use chuck. Compensating mechanism can be removed and the chuck used as any Buck Power chuck.

Sizes and prices: 6"—$475; 8"—$550; 10"—$650; 12"—$700. F.O.B. Kalamazoo. In ordering give the mean diameter of stock to be chucked so that proper size jaw pads can be supplied.

BUCK TOOL COMPANY
512 SCHIPPERS LANE · KALAMAZOO, MICH.

Circle No. 358 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
George L. King	C. A. Norgren Co. Englewood, Colo.	Same	Treasurer
C. Neil Norgren	C. A. Norgren Co. Englewood, Colo.	Same	Executive Vice-President
Leigh H. Norgren	C. A. Norgren Co. Englewood, Colo.	Same	Vice-President in Charge of Engineering and Production
J. A. Wilson	C. A. Norgren Co. Englewood, Colo.	Same	Chief Engineer
Kermit T. Kuck	Monarch Machine Tool Co. Sidney, Ohio	Same	Director
Gilbert T. Coevert	V & O Press Co., Div. of Emhart Mfg. Co. Hudson, N. Y.	Henry & Wright Div., Emhart Mfg. Co. Hudson, N. Y.	General Manager

For a complete line of precision feeds

"RFC" Roll Feeds

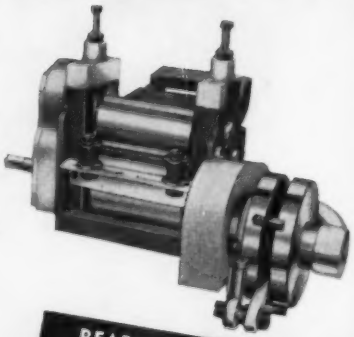
FITS ANY PRESS
For side or rear feeding. All attachments for installing furnished, including disc and connecting linkage.

CAN'T SLIP
Each wedge has four points of contact to safeguard accuracy.

REVERSES INSTANTLY
Merely shift feed finger spring from one lug to the other.

FEEDS IN THOUSANDTHS
Amazingly accurate stock movement assured.

MAINTAINS ORIGINAL SETTING
Regardless of use or wear. No ratchets or pawls to wear down and "Throw off" feed spacing.



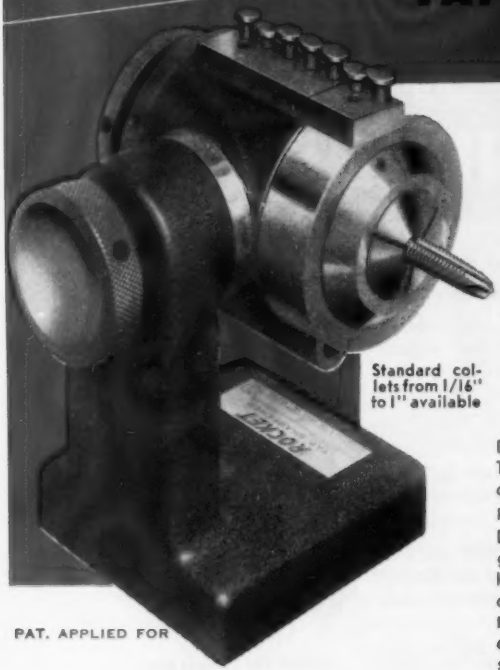
READY FOR MOUNTING
FURNISHED COMPLETE
Early delivery on Standard Models
Write today for latest Bulletin.

Roll Feeds Corp.
ASHTON, R. I.

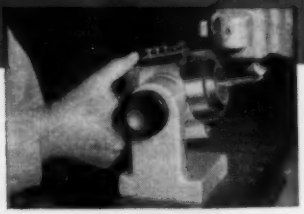
Circle No. 359 on Card, Opposite Page 65

sharpen dull taps swiftly, economically, and accurately

THE Rocket TAP SHARPENER



Standard collets from 1/16" to 1" available



A low Cost

fixture that sharpens dull taps to like new condition

Don't dispose of dull taps! THE ROCKET TAP SHARPENER can save you many dollars in new tap investment — will pay for itself in no time at all.

Designed to do a high precision job of grinding 2, 3, or 4 flutes, right or left hand taps, straight or spiral, the ROCKET carries an unqualified company guarantee of satisfaction. It can be used on any make of tool and cutter grinder or small tool room surface grinder. Simple to operate — no maintenance.

Start reducing tap cost today — examine the ROCKET TAP SHARPENER.

PAT. APPLIED FOR

There's a ROCKET sales representative in your area. We will be glad to direct him to you for a demonstration of this unit. Literature is available upon request.

ROCKFORD DIE & TOOL WORKS, INC.

1820 Seventeenth Ave. • Rockford, Illinois

Circle No. 360 on Card, Opposite Page 65

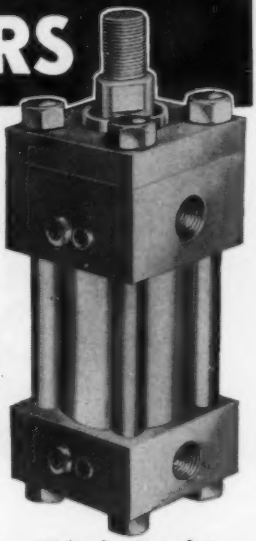
Changes in Executive and Production Personnel

Name	Company	To	Position
Harold O. Warnock	Firth-Loach Metals, Inc. McKeesport, Pa.	Same	Chief Plant Engineer
Frederick L. Chapman	Gisholt Machine Co. Madison, Wis.	Same	Vice-President
George M. Class	Gisholt Machine Co. Madison, Wis.	Same	Vice-President
A. G. Heffer	Gisholt Machine Co. Madison, Wis.	Same	Works Manager
Arthur B. Morey	Gisholt Machine Co. Madison, Wis.	Same	Asst. Treasurer

over 8,000 Different Selections For Immediate Delivery!

Miller - Quality-Famous, Heavy Duty AIR AND HYDRAULIC

CYLINDERS



now "in stock" for immediate shipment to you in popular sizes, mountings

Eliminate costly production delays —speed-up your design and replacement programs — with this greatest quality selection ever offered on such fast delivery service.

AIR CYLINDERS, 200 psi, 1½" through 8" bores, strokes up through 36", over 15 popular mountings, cushioned and non-cushioned.

HYDRAULIC CYLINDERS, 2000 psi, 1½" through 5" bores, strokes up through 36", over 15 popular mountings, cushioned and non-cushioned.

Larger bores (up through 20" air, 12" hydraulic) and longer strokes (up to 22 feet) available on longer delivery.

Write for Complete Data and Prices

Miller

MILLER FLUID POWER DIVISION
FLICK-REEDY CORP.

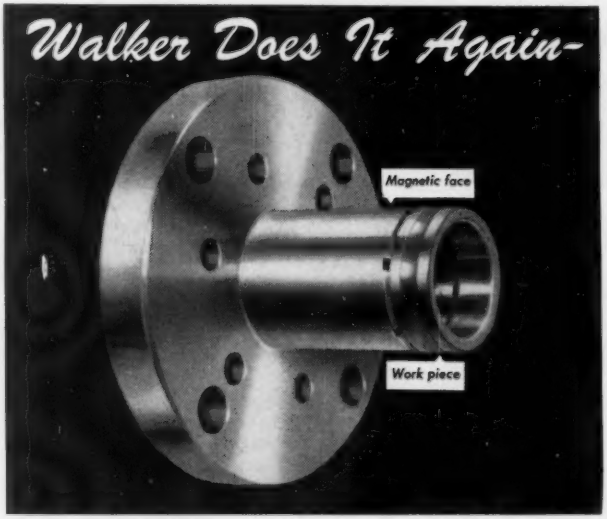
2026 N. HAWTHORNE AVE., MELROSE PARK, ILL.

CYLINDERS • BOOSTERS • ACCUMULATORS
Sales and Service—From Coast To Coast

Circle No. 361 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
H. A. Waddell	Gisholt Machine Co. Madison, Wis.	Same	Treasurer
Theodore Eckert	Harig Mfg. Corp. Chicago, Ill.	Same	Vice-President of Mfg. and Secretary
Herbert Harig	Harig Mfg. Corp. Chicago, Ill.	Same	President and Treasurer
Karl Harig	Harig Mfg. Corp. Chicago, Ill.	Same	Chairman of the Board
George A. Naab	Pneumatic and Elec. Equip. Co. Philadelphia, Pa.	Same	Manager



Automation Requires:—

Magnetic Drivers (simple mounting). Magnetic Holding solves the problem for leading manufacturers of bearings. Again O. S. Walker pioneers with the production of a magnetic driver which adapts itself to bearings for automated operations involving high production.

Whenever any holding device is needed, Walker engineers design and produce it.

O. S. WALKER CO. Inc.
WORCESTER 6, MASSACHUSETTS
Original Designers and Builders of Magnetic Chucks

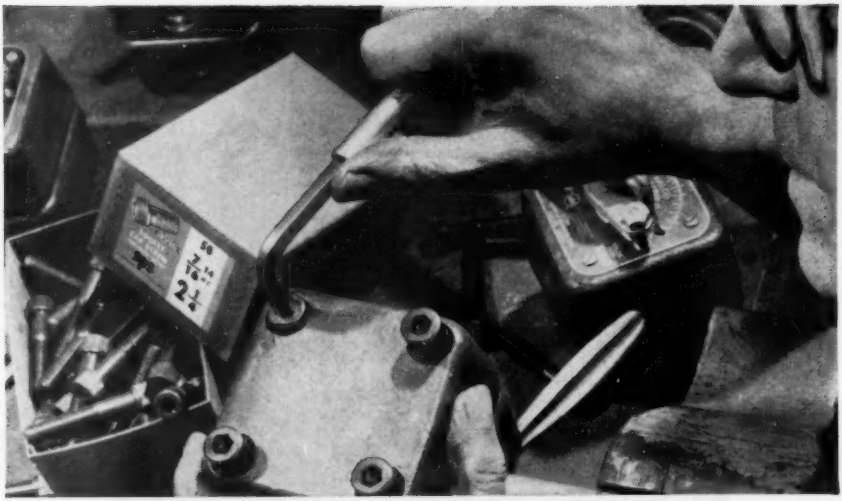
Circle No. 362 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Frederick A. Schneller	Beckman Instruments, Inc. Fullerton, Calif.	Solar Aircraft Co. San Diego, Calif.	Purchasing Agent
Frank M. Thomas	Sylvania Elec. Products Inc. Long Island, N.Y.	Electronics Div., Sylvania Elec. Products Inc. Woburn, Mass.	Mgr., Equip. Development
William T. Ritchie	Machinery Div., Pratt & Whitney Co., Inc. West Hartford, Conn.	Same	General Foreman
Dominic Ricardo	Machinery Div., Pratt & Whitney Co., Inc. West Hartford, Conn.	Same	Manager, Milling Dept.
Harold T. LeMay	Pratt & Whitney Co., Inc. West Hartford, Conn.	Pratt & Whitney & Colt's Patent Firearms Mfg. Co.	Director of Employee Relations

BLADES
ROLLS
WORLD'S HARDEST METAL
● New, improved TALIDE METAL is uniform in quality—gives top performance on ALL cutting, drawing and wear-resistant applications. Write for Catalog 56-G. METAL CARBIDES CORP., Youngstown 12, Ohio.
TOOLS
DIES
BAR STOCK
METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • CERMETS • HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

Circle No. 363 on Card, Opposite Page 65

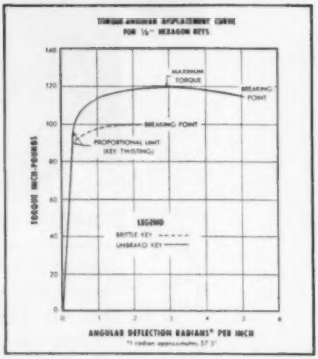


Tighten socket screws tighter, more safely with High-Titan UNBRAKO hex keys

High-Titan UNBRAKO socket screw keys are stronger than ordinary keys. They are made of selected, accurately sized hex stock, with carefully formed 90° bends that won't break. The ends are cut square to engage sockets full depth for highest tightening power. These keys are heat treated uniformly to give hardness and ductility clear through without brittleness or decarburization.

All this results in many advantages. You can torque up a screw tighter with an UNBRAKO than any other key. Performance is consistent—you can apply the same tightening torque every time. Screw sockets won't ream, and the keys won't wear excessively. If you should apply too much torque, a High-Titan would break, but shear off clean and even with the top of the socket—not at the bend—and without leaving jagged exposed edges to gash your hands.

One High-Titan hex key is included with each standard package of UNBRAKO socket screws. High-Titans are also available as sets in convenient, durable plastic key folds, and in bulk. Your authorized industrial distributor carries them in stock. See him today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 52, Pa.



THESE CURVES SHOW THE DIFFERENCE between an UNBRAKO hex key and an ordinary key. The UNBRAKO withstands more tightening torque, twists through 180° without breaking, then shears off even with the top of the screw socket. Ordinary keys snap off suddenly at the bend.

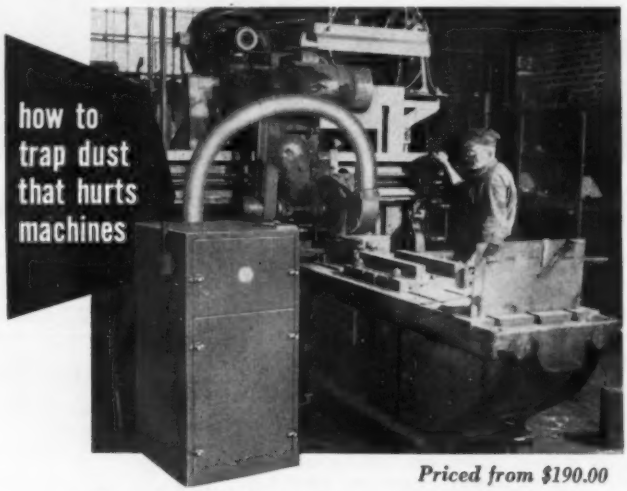
UNBRAKO® SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.
SPS
JENKINTOWN ■ PENNSYLVANIA

Circle No. 364 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
Irwin F. Holland	Pratt & Whitney Co., Inc. Cutting Tool & Gage Div. West Hartford, Conn.	Same	Asst. to Mgr.
Edward J. Shages	Pratt & Whitney Co., Inc. Machinery Div. West Hartford, Conn.	Pratt & Whitney Co., Inc., Cutting Tool & Gage Div.	Factory Manager
Merton C. Grilley	Producto Machine Co. Bridgeport, Conn.	Same	Vice-President
David W. Myers	Producto Machine Co. Bridgeport, Conn.	Same	Vice-President



Priced from $190.00

Moveable TORIT units let you trap dust at its source

Untrapped dust costs you money: "secretly" forces your precision machines out of alignment, slows production, hurts morale. Torit dust collectors solve the problem—fit in almost anywhere. Usually more efficient and money-saving than central (built-into-the-building) systems.

You can move and install Torit units yourself. We'll check the installation—or handle the entire problem if you prefer. Torit units operate only when machines they protect are in use. Filtered air may be returned to room to save heat. Many models and sizes, all self-contained, easy to move. Write today to . . .

Sweet's

TORIT MANUFACTURING CO.
Dept. 603, 303 Walnut Street, St. Paul 2, Minn.

Circle No. 365 on Card, Opposite Page 65

I. F. Holland

E. J. Shages

Merton C. Grilley

David W. Myers

SOLID CARBIDE CUTTING HEADS

Severance CARBO-MILLS GROUND-from-the-Solid

The all-purpose CARBIDE mill at LOW cost. Use them same as you would High Speed mills or Rotary Files — Same machines — Same speeds (or higher). No more, time consuming, "kid-glove" care. Just chuck them up in your regular equipment and watch these RUGGED CARBO-MILLS go to work!

CARBO-MILLS ASK NO SPECIAL FAVORS

3/32" SHANKS

7 Standard Numbers, featuring **REAL** cutting teeth to remove stock faster over long periods of use—as well after regrinding as when new.

CARBO-MILLS by the ORIGINATOR of Ground-from-the-Solid Mills

IN PORTABLE TOOLS

1/8" SHANKS
12 STANDARD NUMBERS
THE POPULAR WORK BENCH SET

NO PROBLEM OF TOOTH CHIPPING OR BRAZE-FAILURE

CARBO-MILLS PREFERRED BY OPERATORS!

1/4" SHANKS

20 STANDARD NUMBERS

20 Standard Numbers (**only 9 illustrated**) cover the widest possible range of uses. Don't continue losing valuable time and money; replace your less efficient Rotary Files with these longer lasting, faster cutting, stamina possessing, CARBO-MILLS at the earliest possible moment!

IN MACHINE TOOLS

LAST UP TO 75 TIMES LONGER THAN ROTARY FILES OF HIGH SPEED

DIE MAKERS!
ASK FOR THIS SET

Furnished to you in a sturdy wooden case; Di-car Set No. 40 is a set of 8, ¼" shank CARBIDE mills designed and instituted specifically for you, the Tool and Die Maker. Specially selected shapes — Special tooth patterns and cuts for all types of precision Tool and Die work. You will ply your skills easier and faster than ever before with these personal finishing mills. These CARBIDE mills need absolutely no coddling and will win their way to the the most favored spot on your Work-Bench! Send for complete information and prices today! Ask for Leaflet No. 645

• • • GROUND-from-the-Solid • • •

REGRINDING — Due to CARBO-MILLS being made of Solid Carbide repeated savings are made possible through successive regrinds.

INVESTIGATE NOW!

FOR COMPLETE INFORMATION AND PRICES SEND FOR BULLETIN CM.

SEVERANCE TOOL INDUSTRIES, INC.

722 Iowa Ave., Saginaw, Michigan

Representatives and Distributors in principal industrial areas

Circle No. 366 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
William T. Wilbur	Progressive Welder Sales Co. Detroit, Mich.	Same	Chief Application Engineer
Donald H. Dalbeck	Reed-Prentice Corp. Worcester, Mass.	Same	President
Roger L. Putnam, Jr.	Package Machinery Co. Springfield, Mass.	Reed-Prentice Corp. Worcester, Mass.	Controller and Secy.
J. Joseph Kelly	Reed-Prentice Corp. Worcester, Mass.	Same	Director
Iver G. Freeman	Reed-Prentice Corp. Worcester, Mass.	Same	Chairman, Management Comm
Earl Hudson	Rockwell Mfg. Co. DuBois, Pa.	Rockwell Mfg. Co. Porterville, Calif.	General Mgr., Meter and Valve Plant
A. Clark Daugherty	Rockwell Mfg. Co. DuBois, Pa.	Same	Asst. to President
William A. Sine, Jr.	SKF Industries, Inc. Philadelphia, Pa.	Same	General Supervisor, Production Material Control and Procurement
W. E. Tretch	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Mfg. Mgr. Ind. Div.
W. N. Ritchie	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Mfg. Mgr. Hardware Div.
E. M. Schempp	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Mfg. Mgr. Steel Div.
A. E. Juram	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Mgr. Ind. Relations Div.
J. H. Mulherin	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Mgr. Metallurgical and Inspection Div.
J. G. Brandt	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Mgr. Materials Control Div.
C. S. Cassels	Henry Disston Div., H. K. Porter Co., Inc. Philadelphia, Pa.	Same	Plant Engineer
Paul W. Polk	The Sheffield Corp. Dayton, O.	Same	Executive Vice-President
John P. Bernard	The Sheffield Corp. Dayton, O.	Toledo Scale Co. Toledo, O.	Executive Vice-President
Thomas L. Norton	Temco Aircraft Corp. Garland, Tex.	Same	Asst. Plant Manager
Roy H. Heidenbrand	Threadwell Tap & Die Co. Greenfield, Mass.	Same	Divisional Manager
H. E. Markley	Timken Roller Bearing Co. Canton, O.	Same	Asst. to the President

William T. Wilbur

Earl Hudson

A. C. Daugherty

H. E. Markley

BOSTON Gear 100 SERIES SPEED REDUCERS

New COST-SAVING "COMBINATION"

permits easy motor change . . . continued operation with spare

The new **100 SERIES RATIOMOTOR** combines a gear reduction unit and an easily detachable, standard end-mounted motor.

MOTOR CAN BE CHANGED in minutes. Gear unit is undisturbed, preserving alignment. Also, the original motor can be replaced with another type of motor (explosion-proof, etc.) at any time.

ANY MODEL NEEDED — FROM STOCK . . . horizontal or vertical — right angle or parallel — single or double reduction.

SOLD WITH OR WITHOUT MOTORS Ratiomotor gear units alone are available as Flanged Reductors . . . you buy and attach any standard end-mounted motors of your choice.

GET CATALOG, full information from your Boston Gear Distributor, or write: Boston Gear Works, 81 Hayward St., Quincy 71, Mass.

7124 "OFF-THE-SHELF" TRANSMISSION PRODUCTS

LOCAL STOCKS
FACTORY PRICES

Call your **BOSTON Gear** DISTRIBUTOR

Circle No. 367 on Card, Opposite Page 65

Changes in Executive and Production Personnel

Name	Company	To	Position
George L. Deal	Timken Roller Bearing Co. Canton, O.	Same	Secy. and Treas.
James G. Tuthill	Tuthill Pump Co. Chicago, Ill.	Same	President
H. T. Kessler	Tuthill Pump Co. Chicago, Ill.	Has retired from his position as President	
Myron C. Taylor	United States Steel Corp. Chicago, Ill.	Has retired from his position as Director	
John F. Holt	United States Steel Corp. Fairless Works Pittsburgh, Pa.	U. S. Steel Corp. Gary, Ind.	Supt., Coke and Coal Chem. Div.
Desmond S. Chambers	Vanadium-Alloys Steel Co. Latrobe, Pa.	Same	Plant Metallurgist
Charles F. Sawyer	Vanadium-Alloys Steel Co. Latrobe, Pa.	Same	Works Manager
S. Frank Isler	Vanadium Corp. of America Cambridge, O.	Vanadium Corp. of America New York, N.Y.	Director of Industrial Relations
Dale Zumbrunnen	Vanadium Corp. of America Cambridge, O.	Same	Manager, Alloy Producing Plant
Martin C. Falk	Warren Steel Div., Copperweld Steel Corp. Warren, O.	Yoder Company Cleveland, O.	Chief Research Engineer

Changes in Sales and Service Personnel

Name	Company	To	Position
J. Robert Sansom	Dexion Div., Acme Steel Co. Chicago, Ill.	Same	Manager, Distributer Sales
H. Gene Miller	Bossert Company Kansas City, Mo.	Bay State Abrasive Products Co. Westboro, Mass.	Abrasive Eng. for Minn., Wis.
R. Stanley Burt	Carborundum Co., Electro Minerals Div. Niagara Falls, N.Y.	Same	Abrasive Grain Specialist for Ill., Wis., Ia.
Edward J. Schultz	Carborundum Co., Electro Minerals Div. Niagara Falls, N.Y.	Same	Abrasive Grain Specialist for Mich., Toledo, O.
Robert A. Murphy	Carborundum Co., Electro Minerals Div. Niagara Falls, N.Y.	Same	Abrasive Grain Specialist for New England area
Joseph M. Morin	Carborundum Co., Electro Minerals Div. Niagara Falls, N.Y.	Same	Abrasive Grain Specialist for N.Y., N.J.
J. William Wade	Spirella Co., Inc. Niagara Falls, N.Y.	Carborundum Co., Advertising Branch Niagara Falls, N.Y.	Asst. Manager
Augustus T. Murray	Carborundum Co., Coated Abrasives Div. Niagara Falls, N.Y.	Same	Sales Manager for Buffalo and Pittsburgh areas
Oliver P. Quist	Carborundum Co., Coated Abrasives Div. Chicago, Ill.	Eastern Div., with headquarters at West Springfield, Mass.	Sales Manager, New England and New York areas
Wm. J. Reid	Carborundum Co., Coated Abrasives Div. Detroit, Mich.	Midwestern District, with headquarters at Chicago, Ill.	Sales Manager
R. W. Titgemeyer	Carpenter Steel Co. Reading, Pa.	Same	Asst. Branch Mgr., Los Angeles territory
John E. Newlin, Jr.	Henry Disston & Sons Co., Inc. Philadelphia, Pa.	Carpenter Steel Co. Reading, Pa.	Mgr., Tool Steel Sales
Wm. T. Hopf	Chicago Latrobe Twist Drill Works Chicago, Ill.	Same	Sales and Service Rep. for the Midwest
Harry T. Stredtman	Chicago Latrobe Twist Drill Works Chicago, Ill.	Same	Rep. for Ind. and Ky., with headquarters in Indianapolis

George Deal

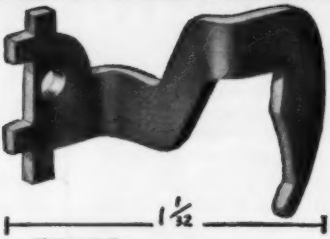
G. Robert Sansom

H. Gene Miller

John E. Newlin, Jr.

STAMPINGS
IN SMALL LOTS

This sketch briefly describes the cost of typical parts made for one of our earliest customers, whom we have served for the past thirty-four years.



EXAMPLE
MAT'L. C. R. STEEL
The cost of blanking, piercing and forming, including all tools:

First 100.....$69.25
Each add'l. 100.....4.50

Plus actual cost of material used for stampings.

We have the nation's very best facilities and know-how to produce short-run stampings at the lowest possible cost. Send your sketch, blueprint, or part, plus quantity, for prompt quotation.

DAYTON ROGERS
Manufacturing Company

MINNEAPOLIS 7C, MINNESOTA

Circle No. 368 on Card, Opposite Page 65

KEEP PRODUCTION HUMMING with VIMCO *Light*

INSTANT ADJUSTABILITY

Wide range swivel casts soft light over a 340° arc.

Steel wrapped flexible arm moves easily . . . stays rigidly in any position . . . protects wiring.

The Vimco secret to soft, comfortable light that keeps operators working efficiently all shift long . . . is superb adjustability. Vimcolights move easily to any position the operator desires . . . no bolts or screws to loosen, then reset. This means Vimcolights are never over-intense or under-intense, but can be immediately set to give light that's just right. Keep production humming round the clock . . . install Vimcolights on your machines.

Machine Builders: Write for "OEM Bulletin"

Production Men: Request "Bulletin 85"

Vimcolights are (UL) listed

VIMCO MFG. CO., INC.
Since 1919

109 Brayton Street Buffalo, N.Y.

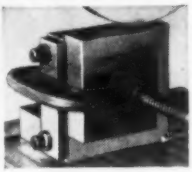
Circle No. 369 on Card, Opposite Page 65

LASSY MASTER V-BLOCK ANGLE PLATES

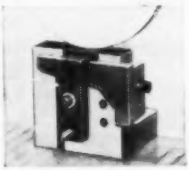
Proven Time Savers!

A Master tool of versatility for every day use in . . . inspection and machining operations.

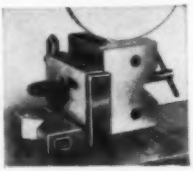
This Master V-Block Angle Plate is an improved new design. Saves hours of setup time. Assures precise work accuracy. Requires less skill.



Side Gage automatically squares work precisely and without removing angle plate from chuck. Repetitive accuracy maintained.



Adjustable parallel holds the smallest work for position and clamping with ease and accuracy.



LASSY MASTER Angle Plate also provides a master setup for regrinding of worn or inaccurate Angle Plates.

The LASSY MASTER Angle Plate is an indispensable tool precisely accurate and dependable.

WRITE FOR ILLUSTRATED LITERATURE

LASSY TOOL COMPANY

PLAINVILLE, CONN.

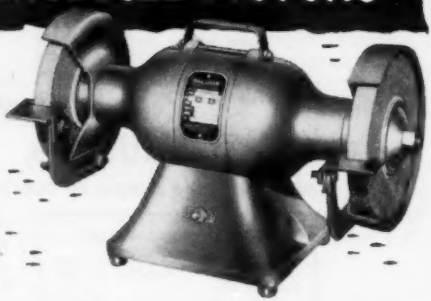
Circle No. 370 on Card, Opposite Page 65

Changes in Sales and Service Personnel

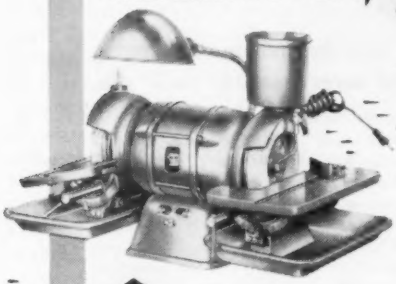
Name	Company	To	Position
L. B. Lumpkin	The Bristol Co. Birmingham, Ala.	The Bristol Co. Pittsburgh, Pa.	District Manager
W. C. Peterson	The Bristol Co. New York, N.Y.	The Bristol Co. Birmingham, Ala.	District Manager
Earl R. Dew		Clearing Machine Corp. Toledo, O.	Sales Representative
Kenneth M. Acton	Crucible Steel Co. of America San Francisco, Calif.	Same	Asst. Manager
Thomas J. Behan	Crucible Steel Co. of America Buffalo, N.Y.	Same	Asst. Manager
Gregory B. Perry	Houston Port Bureau Houston, Texas	Diamond Alkali Co. Cleveland, O.	General Traffic Manager

LAST YEARS LONGER!

Baldor GRINDERS with TOTALLY ENCLOSED MOTORS



600 Series Grinder. ½ HP, 1 phase, 60 cycle, 3450 RPM, 6" wheels, $57.00. Pedestals available for all models



Carbide Tool Grinder. Sharpens quickly, accurately. Reversible ½ HP motor withstands repeated overloads 1½" wide wheels. $169.70.

Specially engineered for extra heavy-duty, precision grinding! You can't get more regardless of price!

- Totally enclosed, splash-proof motors keep out dust, dirt, grit, metal particles. Can't clog . . . can't cause trouble!
- Lifetime lubricated ball-bearing motors never require servicing! Dynamic balancing assures smooth operation without vibration.
- Complete line—¼ HP to 3 HP, 6" to 12" individually balanced wheels. Bench and pedestal types.
- Fully guaranteed by Baldor—famous for fine grinders for more than 35 years!

It pays to use dependable Baldor Grinders!

BALDOR ELECTRIC CO.
4364 Duncan Ave. • St. Louis 10, Mo.

Write for Bulletin 321-M.

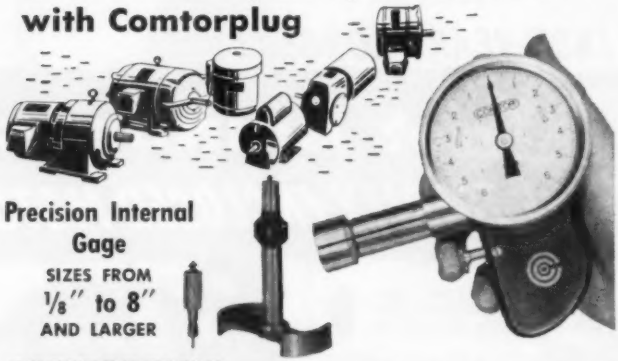
Circle No. 371 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
Homer E. Schuchman	Diamond Alkali Co. Cleveland, O.	Same	Asst. Gen. Traffic Mgr.
Edward L. Santner	Diamond Alkali Co. Cleveland, O.	Same	Asst. Gen. Traffic Mgr., Tank Car Operation Mgr.
Frederick T. Clark	Diamond Alkali Co. Cleveland, O.	Has retired from his position as Asst. Gen. Traffic Mgr.	
Byron Confer		Etter Tool Co. Indianapolis, Ind.	District Sales Manager
A. S. Blagden	The Cleveland Punch & Shear Wks. Cleveland, O.	The Federal Machine & Welder Co. Warren, O.	Sales Engineer, Warco Press Dept.
Floyd A. Fowler	Toledo Iron & Steel Co. Toledo, O.	Horsburgh & Scott Co. Cleveland, O.	Sales Representative

Did you know that---

Some of the best known electric motors are quality-controlled with Comtorplug



Precision Internal Gage

SIZES FROM 1/8" to 8" AND LARGER

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8" to 8" dia.

UNIQUE ADVANTAGES

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging — automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable — no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, guided missile, farm machinery, automotive transmission, household appliance, and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

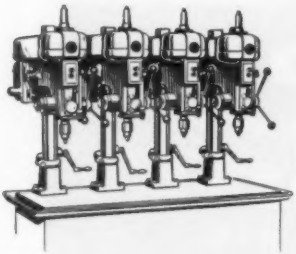
COMTOR CO.
62 Farwell St.
Waltham 54,
Massachusetts

GET THE FULL FACTS — REQUEST BULLETIN 49

Circle No. 372 on Card, Opposite Page 65

WALKER-TURNER

6″ Spindle travel means BIG MACHINE capacity in this 15″ Drill Press!



You don't have to go to a 20″ or larger drill press to get 6″ spindle travel. With this 15″ Walker-Turner, you can drill holes up to 6″ deep at one pass of the drill, in diameters from #60 to ½″.

This extra-capacity "LIGHT-HEAVY-WEIGHT" is built to deliver fast, accurate production drilling in your plant, 24 hours a day, for a long span of years.

1300 Series — Walker-Turner "Light-Heavyweight" 15″ Drill Press — full 6″ spindle travel; six-spline, full floating spindle; speeds from 480 to 5000 rpm, depending on motor and pulleys; Jacobs Chuck, or No. 1 Morse taper available. (15″ Walker-Turner "LIGHT-HEAVY-WEIGHT" Drill Press with 4″ spindle travel — 1200 series — also available.)

Ask your Walker-Turner Distributor to *demonstrate* the big capacity of this 15″ W-T Drill Press. He's listed under "Tools" in your phone book's Yellow Pages. Or write for his name and full specifications on these machines.

DRILL PRESSES, HAND AND POWER FEED — AIR FEED DRILL PRESS ATTACHMENT
RADIAL DRILLS — WOOD AND METAL CUTTING BAND SAWS — TILTING ARBOR SAWS
RADIAL SAWS — JIG SAWS — CUT-OFF SAWS — LATHES — SPINDLE SHAPERS
JOINTERS — BELT AND DISC SURFACERS — FLEXIBLE SHAFT MACHINES

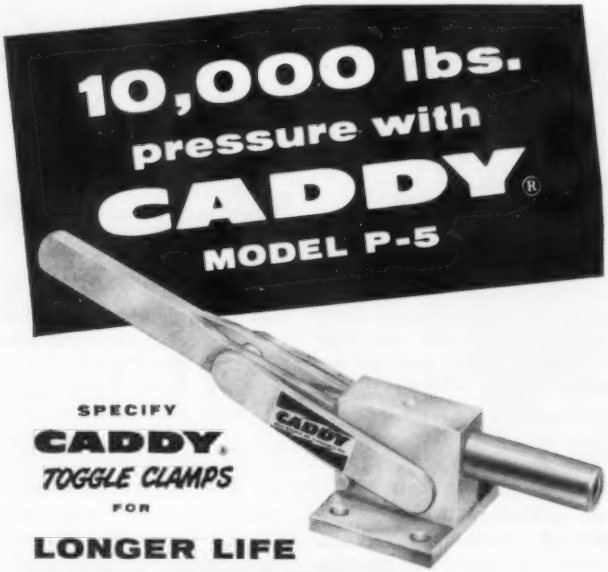
walker-turner

WALKER-TURNER
Division
Kearney And Trecker Corporation • Plainfield, N. J.

Circle No. 373 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
David C. Maxwell	American Electric Fusion Corp. Chicago, Ill.	Kaydon Engineering Corp. Muskegon, Mich.	Asst. Sales Mgr., Needle Roller Div.
Edward J. Novack	Kennametal Inc. Detroit, Mich.	Same	Special Representative
Frank N. Phelps, Jr.		Modern Engineering Co. St. Louis, Mo.	Advertising Mgr., Oxy-Acetylene Welding & Cutting Apparatus Div.
W. Atkins		National Automatic Tool Co., Inc. New York, N.Y.	Sales Engineer
J. A. Stamback		National Automatic Tool Co., Inc. Buffalo, N.Y.	Sales Engineer



SPECIFY
CADDY®
TOGGLE CLAMPS
FOR

LONGER LIFE
MORE PRESSURE
FASTER ACTION

Send for your FREE 1956 Template catalog today

CADDY®
Erico Products, Inc.
2070 E. 61st Place • Cleveland 3, Ohio
IN CANADA: ERICO INCORPORATED, 3571 Dundas St., West, Toronto 9, Ontario

Circle No. 374 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
Frank W. Jenkinson		Adamas Carbide Corp. Cleveland, O.	District Manager
Bernard F. Nelson	Shepherd Machinery Co. Los Angeles, Calif.	American Potash & Chemical Corp. Los Angeles, Calif.	Area Rep., Aerosol and Refrig. Div.
James E. Butler	Borg-Warner Corp., Industrial Div., Chicago, Ill.	Atkins Saw Div., Borg-Warner Corp. Indianapolis, Ind.	Sales Mgr. Industrial and Hardware Div.
B. L. Owens	Atkins Saw Div., Borg-Warner Corp. Indianapolis, Ind.	Same	Director of Sales
Joseph J. Sweeney	Skil Corp., Wholesale Div. Chicago, Ill.	Atkins Saw Div., Borg-Warner Corp. Indianapolis, Ind.	Director of Marketing Industrial and Hardware Div.

NOW

FROM THIS CATALOG

NEW CARBIDE TOOLING PRECISION-MADE

Golden-Circle Rotary Tools

New! Elgin's expanded line of burs and rotary files, plus solid carbide end mills, all shapes and sizes precision-made. See how they can meet your requirements at lower cost! Write for your FREE copy of the new "Golden Circle" booklet today!

ABRASIVE DIVISION, DEPT. (K)

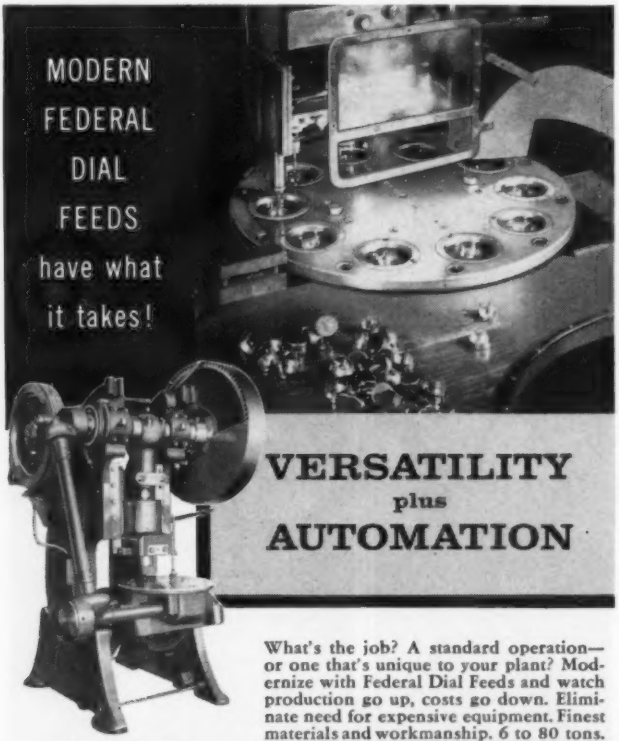
ELGIN NATIONAL WATCH COMPANY

Elgin, Illinois

Circle No. 375 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
Thomas Herald	Syntron Company Pittsburgh branch	Syntron Company New York branch	Vice-President of the New York branch
John B. Dempsey	Thor Power Tool Co. Detroit branch	Same Aurora, Ill.	Manager of Electric Tool Sale
Donald E. Custance	Progressive Welder Sales Co. Detroit, Mich.	Same	Asst. Sales Manager
Robert Barley	Progressive Welder Sales Co. Detroit, Mich.	Same	General Sales Manager
William C. Davidson	Norton Company West Virginia branch	Same	Abrasive Engineer Dayton Area



No. 7 Dial Feed
Capacity, 80 tons

Write for new Dial Feed Catalog

What's the job? A standard operation—or one that's unique to your plant? Modernize with Federal Dial Feeds and watch production go up, costs go down. Eliminate need for expensive equipment. Finest materials and workmanship. 6 to 80 tons. Automatic feeds and ejectors if desired.

THE FEDERAL PRESS COMPANY
610 Division Street, Elkhart, Indiana

FEDERAL DIAL FEED ***PRESSES***

31 Years' Experience in Dial Feed Engineering and Construction

Circle No. 376 on Card, Opposite Page 65

Can your tapper pass this Performance Test?

(CHECK IF "YES" ONLY)

- ☐ Maintains production for long periods
- ☐ Less operator fatigue
- ☐ Fewer Broken taps
- ☐ Less "down time" interruption
- ☐ Fewer spoiled pieces
- ☐ Maintains accuracy at high speeds

If You Cannot Answer Yes to Each of the Above... Your Tapper is Not Operating Efficiently

Unquestionably, there is a difference in tapping heads and in Procunier you'll find that **unmistakable** difference. If your tapper is not producing up to par—regardless of your demands and schedules—it will pay you to check into the possibility of using Procunier. Designed by practical engineers, they have been consistently producing "profitably" under "back breaking" production schedules.

Procunier superiority can be attributed to many unique construction characteristics—a practical double cone, cork faced friction clutch, wobble-free spindle, quick start, stop and reverse mechanism, finger tip control, exclusive tap holder, plus a host of others.

Procunier heads are unduplicated for accuracy, dependability and all 'round efficiency. They are **proven performers.** Get the full story today. Write for free brochure.

Write for Free Brochure giving the full, interesting Procunier Story with parts chart and graph on the complete Procunier line.

PROCUNIER

Safety Chuck Co.
14 S. Clinton St.
Chicago 6, Ill.

PROCUNIER SAFETY CHUCK CO.
14 S. Clinton St., Chicago 6, Ill. **Dept. 5**

Gentlemen: Please send your Free Illustrated Brochure.

Name.....

Address.....

City.....Zone....State.....

Circle No. 377 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
W. Fay Aller	Sheffield Corp. Dayton, Ohio	Same	Div. Manager
Victor Boll	Sheffield Corp. Dayton, Ohio	Same	Div. Manager
Jack Welch	Sheffield Corp. Dayton, Ohio	Same	Div. Manager
William I. Wilt	Sheffield Corp. Dayton, Ohio	Same	Div. Manager
Benton D. Witemeyer	Sheffield Corp. Dayton, Ohio	Same	Div. Manager

The S-22 MICROFINISH COMPARATOR

GAGE SURFACE FINISH TO NEW A.S.A. STANDARDS - *Quickly - Accurately*

This convenient pocket comparator has 22 precision surfaces for specifying and controlling finish to the new A.S.A. Standard B46.1 - 1955. Electroformed in durable corrosion-resistant nickel, the S-22 Comparator provides every department with the most inexpensive method for uniform, accurate control of finish characteristics.

Save valuable time in engineering, inspection, quality control—eliminate costly overfinishing in purchasing and production. $15.00 complete with leather case.

Available from leading industrial distributors, or write

BAPTIST MACHINE CO.

38 Ludlow Street, Stamford, Conn.

Circle No. 378 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
Cheever H. Ely	Norton Company Dayton, Ohio	Same	Cleveland District Manager
Dale V. Cropsey	Potter & Brumfield Princeton, Ind.	Same	Division Vice-President in Charge of Sales
Otto Shellenberger	Thor Power Tool Co. Detroit branch	Same	Detroit Manager
Lynn G. White	Toolset Div. of General Riveters Buffalo, N. Y.	Same	Sales Manager
L. B. Mytinger	Turchan Follower Mach. Co. Detroit, Mich.	Same	Sales Manager
Chesley Somerton	Wales-Strippit of Canada Ltd., Hamilton, Ontario	Wales-Strippit Corp. North Tonawanda, N.Y.	Asst. Sales Manager

Take the direct approach to versatile tooling!

REPLACE OLD-FASHIONED LATHE GRINDERS WITH PRECISE POWER QUILLS!

Power Quill is a new name for a new tool that outperforms and outlasts lathe grinders, and saves fortunes through increased tooling versatility! Precise Super 60 Power Quills are unlimited in application, can be used on any machine and mounted in any position to mill, grind, finish, or micro-mill any material with abrasive wheels and tungsten carbide tools. And look at these exclusive Power Quill features:

OPERATE AT SPEEDS UP TO 45,000 RPM, DEVELOP FULL ½ H.P.

CAN FINISH TO 5 MICRO INCHES AND .0001" TOLERANCES ON PRODUCTION MILLING AND GRINDING WITH CARBIDE TOOLS.

MOTOR AND SPINDLE ARE IN ONE COMPACT, DIRECT-LINE, SOLID STEEL PACKAGE WITH GREATER SPEED (45,000 RPM) TORQUE, ACCURACY AND RIGIDITY.

REMOVE METAL FASTER. BETTER SURFACE FINISHES. INCREASE TOOL LIFE.

MOUNT IN ANY POSITION, ON ANY MACHINE, WITH PRECISE MOUNT—FAST!

Attach this ad to your letterhead for FREE demonstration or literature!

PRECISE PRODUCTS CORP.
1331 CLARK STREET, RACINE, WISC.

Quality and precision since 1882

Grinder-Millers - Power Quills - High RPM Milling Machines - Mounts and Accessories - Rotary Tools

Precise

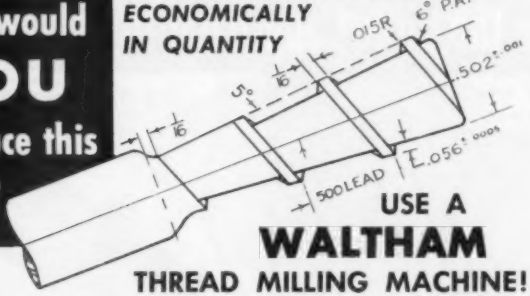
Circle No. 379 on Card, Opposite Page 65

Changes in Sales and Service Personnel

Name	Company	To	Position
William Thorp	Harig Mfg. Corp. Chicago, Ill.	Same	Vice-President of Sales
A. M. Thomas	Heller Bros. Co. Chicago branch	Same	Director of Sales
Larry Darnell	Metro Tool and Gage Chicago, Ill.	U.S. Broach Co. Detroit, Mich.	Sales Manager
William J. Ferrick	Wilton Tool Mfg. Co., Inc. Chicago, Ill.	Same	Sales Manager
Alex J. Vogl	Wilton Tool Mfg. Co., Inc. Chicago, Ill.	Same	Vice-President for Sales

How would YOU produce this part?

TO EXACT SPECIFICATIONS ECONOMICALLY IN QUANTITY



USE A WALTHAM THREAD MILLING MACHINE!

Because it has . . .

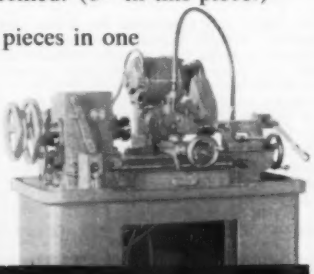
1. Ability to gear for fast leads combined with high helix angle. (15° helix angle on this part.)

2. A cutter head designed so that a base angle may be swiveled so as to place the axis of the cutter spindle at the required angle to the axis of the work piece (5° in this piece).

3. Is equipped with a taper attachment which may be adjusted to produce the taper specified. (5° in this piece.)

4. Will produce finished work pieces in one pass of the cutter.

5. Maintains long-lived accuracy with a minimum of costly repairs and maintenance.



Brochure #501 gives full information — we'll be glad to send your copy.

WALTHAM *MACHINE WORKS, INC.*
296 Newton Street, Waltham, Mass.

Circle No. 380 on Card, Opposite Page 65

WHY GENERATE
WHEN YOU CAN CONVERT?
GET DC DIRECTLY FROM AC

Cut costs, maintenance, replacements with

Federal

SELENIUM RECTIFIER EQUIPMENTS

Famous for steady, long-life power supply

Federal's compact, rugged, silent, ever-dependable selenium rectifiers are the *economical, efficient* way to get DC . . . for chucks, brakes, clutches, drums, pulleys, relays, circuit-breakers, solenoids, motors and many other applications . . . for all DC needs of the machine tool industry!

Equipments are ready to connect to AC . . . ready to deliver uninterrupted service!

For information on any rating, write to Power Equipment Department—E-4140.

Federal Telephone and Radio Company

COMPONENTS DIVISION

100 Kingsland Road — Clifton, N. J.

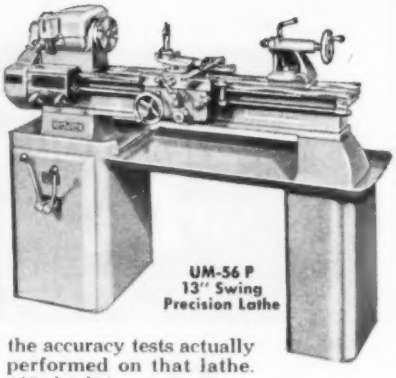
SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13". . . in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

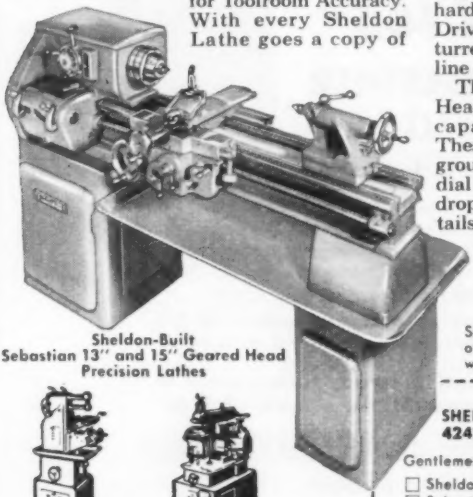
All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of the accuracy tests actually performed on that lathe. (19 checks).



UM-56 P
13" Swing
Precision Lathe

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.



Sheldon-Built
Sebastian 13" and 15" Geared Head
Precision Lathes

SHELDON
Horizontal Milling Machine

SHELDON
12" Shaper

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

4242 North Knox Ave • Chicago 41, Ill.

Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

SHELDON MACHINE CO., INC.
4242 North Knox Avenue, Chicago 41, Illinois

Gentlemen: Please send new catalogs describing:

☐ Sheldon ☐ 10", ☐ 11' ☐ 13" Lathes
☐ Sebastian 13" and 15' Geared Head Lathes
☐ Horizontal Milling Machine ☐ Name of Local Dealer
☐ Sheldon 12" Shaper ☐ Have representative Call

Name ..... Title .....

Company Name .....

Street Address ..... ☐ Company ☐ Home

City ..... State .....

Circle No. 382 on Card, Opposite Page 65

Edited by **D. M. Carlson,** Assistant Editor

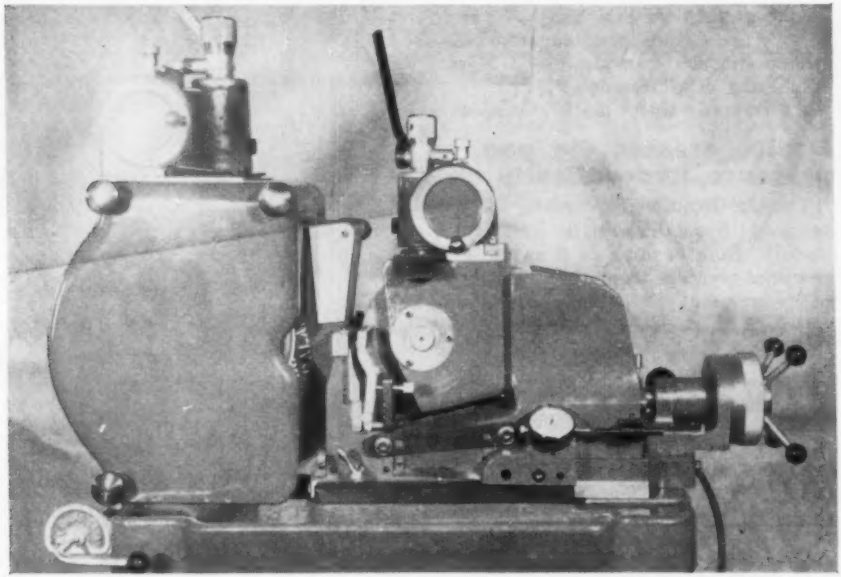
Centerless Grinder for Thrufeed, Plunge, Infeed Grinding

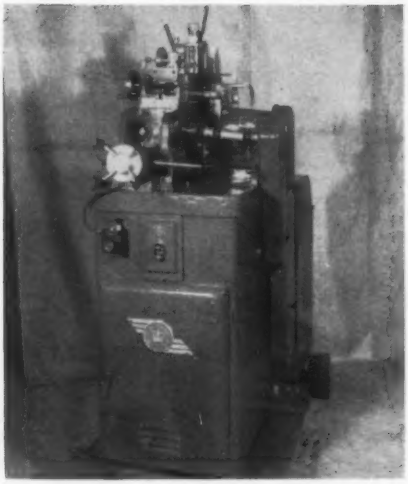
The Royal Master Model TG-12 centerless grinder was designed to grind small diameter forms, which might call for plunge or infeed type of grinding, as well as long rods of small diameter.

Tolerances as low as .0002" can be consistently held, and six to eight micro-finishes are easily obtained. Close tolerance lathe work on small parts can be eliminated by finish grinding to size on this machine.

The massive heat treated alloy work wheel spindle is mounted in pre-loaded ball bearings. The bearings are lubricated for life when the machine is assembled and are protected with a labyrinth at each end of the spindle housing. The spindle assembly is mounted directly into the head stock.

Regulating wheel spindle is mounted between ball bearings, preventing deflection of the spindle. Manual combina-





tion contour and straight dressers for work wheel and regulating wheel are furnished. Traverse movement is accomplished through a bronze nut and lead screw arrangement.

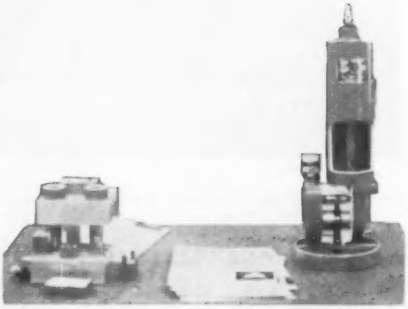
Grinder will handle practically any shape up to 1" dia. and many shapes up to 1½" dia. Grinds anything from plastics to tungsten carbide. Royal Master Inc., Dept. RS, Riverdale, N.J.

Use ACTION Card opposite page 64. Encircle No. 1

Device creates die pad pressure hydraulically

The Die-Draulic Grip creates die pad pressure hydraulically to hold stock smooth while forming or drawing. Full required pressure from near the start of pad movement. Pressure is easily adjustable. There is no waste, since only the required amount of pressure is used. Several pressures from one unit afford correct application to each die station.

The multi-unit Model M516 may be employed as primary pressure to pad or for stripping. Being energized by the 100 pound nominal air line, the pressure may be applied throughout down or up stroke of press or by a valve arrangement at an arranged point. Unit



delivers 2500 p.s.i. The total pressure obtainable at a pad is governored by the piston area available, each square inch of piston area delivering 2500 pounds. Die-Draulic Grip, Inc., Dept. JS, 528 Butterworth St., S.W., Grand Rapids, Mich.

Use ACTION Card opposite page 64. Encircle No. 2

Tachometer has overspeed, underspeed controls

This Metron tachometer not only indicates speed, but actuates self-contained power relays that signal over-

Now.... AVAILABLE FROM STOCK *Jarvis* PIPE TAPS

WITH STANDARD HAND TAP SHANKS!

Here's the answer to the problems presented by conventional pipe taps! Exclusive Jarvis Pipe Taps with standard hand tap shanks easily fit any tapping machine or device—with never a chucking bottleneck. This addition to the dependable Jarvis line of standard taps affords new tapping versatility and precision.

Here's the big advantage of Jarvis taps with Standard Hand Tap Shanks—

	¼"—18 N P T Standard Pipe Tap	¼"—18 N P T New Jarvis Pipe Tap
Shank dia.	.5625	.480
Square size	.421	.360
Overall lgth.	2 7/16"	3 1/16"

Three other sizes are stocked—⅛", ⅜", ½"—and all save man-hours, production dollars. A Jarvis representative is as near as your phone.

Send Today for Catalog!

Complete manual with tap data and tips for better tapping is yours for the asking!

Jarvis
CORPORATION
POWER TOOLS FOR INDUSTRY
MIDDLETOWN, CONNECTICUT

Circle No. 2A on Card, Opposite Page 65

It's not always possible to launder *all* chips or filings out of ordinary wiping material. Chips come back to scar men and metal, to plague your production line. This man has already had 4 wiper cuts.

He had 4 wiper cuts last month

Easy to distribute . . .
always a clean one handy

They really soak up oil . . .
good for solvents, too

When thoroughly used . . .
toss 'em in the trash

Chips can't hide in a clean Scott Wiper. Each Wiper is new, fresh from the carton. A man takes a Scott Wiper as he needs it . . . for his face, his hands, his product.

. . . He had none!

The difference is . . . Scott Wipers

This is sanitary wiping. A man uses a Scott Wiper thoroughly, throws it away—takes a new one. No danger of cuts from hidden chips . . . no fear of skin infection from dirty wipers . . . when you take a fresh wiper.

With disposable Scott Wipers, handling and distribution are simplified. Laundering, sorting and baling are eliminated.

Your Scott representative or distributor will demonstrate any time you say. Call him or mail coupon.

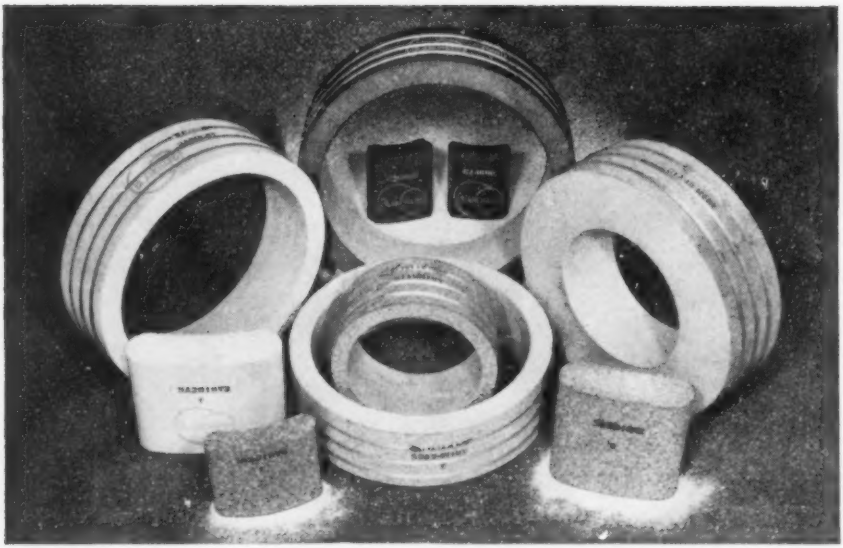
Scott Paper Co., Dept. 2-M
Chester, Pa.
Send information on Scott Wipers.

Name_____

Company_____

Position_____

Address_____



Here's why Blanchard Wheels are best for Blanchard grinding

Almost thirty years ago, Blanchard began developing and manufacturing better grinding wheels for Blanchard Surface Grinders. Our research first produced silicate bonded wheels, and then resinoid bonded wheels.

Today, Blanchard offers silicate, resinoid and vitrified bonded wheels . . . scientifically manufactured and accurately graded in our modern wheel plant.

Use Blanchard Wheels on your Blanchard Grinders. The correct wheel gives you peak production and economy on each job . . . whether the work is tough as copper or fragile as glass, whether it requires heavy roughing cuts or precision grinding within .000010" of absolute flatness and surface finish of 1 micro-inch.

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

THE BLANCHARD MACHINE COMPANY 64 State St., Cambridge 39, Mass. MTB

Please send "The Art of Blanchard Surface Grinding" (3rd Ed.)

NAME_____ STREET_____

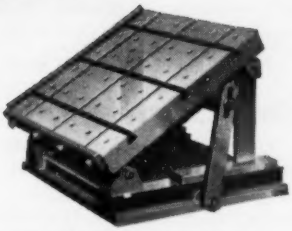
FIRM_____ CITY_____ ZONE____ STATE_____

256-D

Circle No. 2D on Card, Opposite Page 65

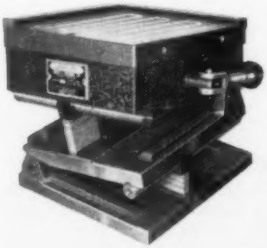
Robbins ...THE COMPLETE LINE OF ANGULAR TOOLING EQUIPMENT

Save dollars in valuable tool room time on every job! Set-ups that require hours by other methods take minutes the Robbins way. Just four simple steps: (1) Look up required angle in Table of Constants furnished with each tool, (2) Select gage blocks from the Table, (3) Place gage blocks between base of unit and sine bar swivel block, (4) Secure the work . . . and you're ready to go! Complete range of models and sizes brings Robbins precision equipment within the reach of every shop, large or small.



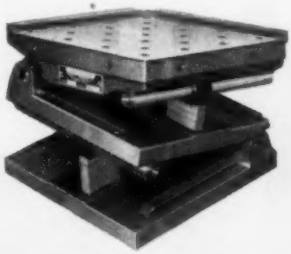
HEAVY DUTY SINE PLATES FOR MILLING AND BORING

Fool proof! Rugged enough to take thrust and chatter of heavy cuts . . . yet built to tool room accuracy for the most exacting inspection operations.



"MAGNA-SINE" MAGNETIC TABLES FOR PRECISION GRINDING

Set up and grind any single or compound angle fast! Work is held securely by magnetic attraction, clamped or released in an instant. Work can't warp or move.



INSPECTION SINE PLATE FOR EVERY INSPECTION OPERATION

Eliminate chance of errors in inspection department and tool room! No more V-blocks, angle plates, or complicated built-up sets of blocks. Simple, fast and sure.

Write or call for complete information now!

OMER E. Robbins COMPANY

24800 PLYMOUTH ROAD DEPT. A-7 DETROIT 39, MICH.

Also producers of special machinery, gages and fixtures

speeds and underspeeds. For use in sounding alarms, turning on light signals, stopping or starting equipment, opening or closing valves, controlling speeds, etc.

High and low limit pointers are independently adjustable. These pointers act as a single-pole double throw switch with the regular speed pointer acting as the switch center arm. A manual reset push button is used to reset the tachometer after the relays have signalled a high or low speed. Metron Instrument Co., Dept. OH, 432 Lincoln St., Denver 3, Colo.

Use ACTION Card opposite page 64. Encircle No. 3

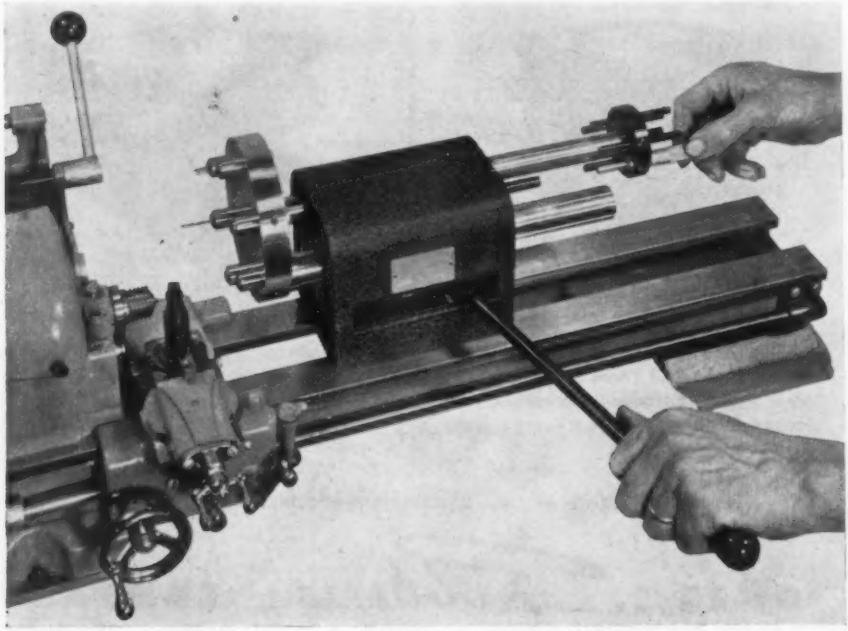
Drilling Head for Close Tolerance Work

Hawkeye's Model LH-200 concentricity drilling head may be used on any lathe and is easily transferable from one machine to another.

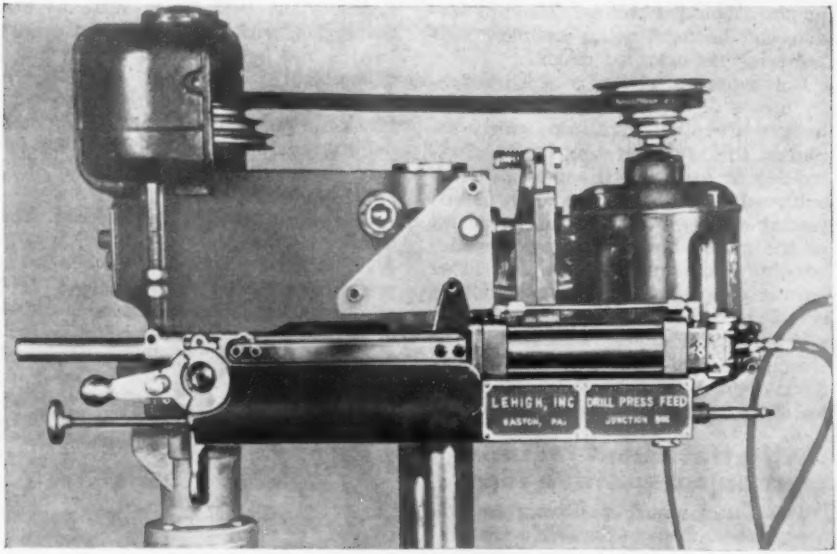
It has ¼" vertical adjustment and fits lathes from 6" swing and up, regardless of make, and will take a standard ⅝" shank. The approximate weight of the head is 22 lb., and length of travel 3". The centerline of pilot shaft to base is approx. 2-63/64", with head clearance over base of 1⅜".

Accurate micro feed gives the operator control of the smallest drills with little breakage. Two spring-loaded pressure pads automatically take up wear and assure positive travel. Other features include a positive lock stop with fast and accurate setting, one adjustable direct master pilot that locates all six stations and four oil-cushioned bearings. Hawkeye Specialty Co., 1532 West 14th St., Davenport, Ia.

Use ACTION Card opposite page 64. Encircle No. 4



Drill Press Feed Provides Controlled Automation



Designed to be attached to any drill press, milling machine or other tool where controlled power is required to rotate a drive shaft, this heavy duty drill press feed converts hand operations and controls to semi or completely automatic.

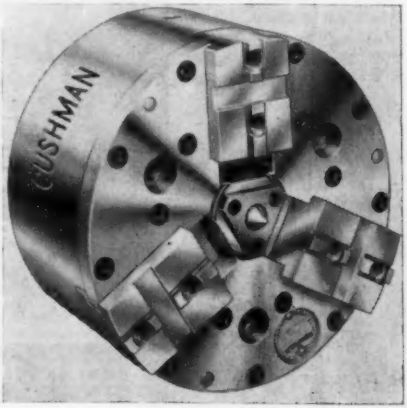
The power plant is reciprocating air motor, or air cylinder, with built-in control valve. The air motor operates from shop air pressure to drive a rack and pinion lowering or retracting the quill assembly of the drill press automatically at pre-selected speeds.

The out, or power stroke, is the outward stroke of the air cylinder. This stroke is hydraulically checked at a pre-set point to give controlled speed of the work stroke and to lessen drill breakage at the break-through point. A built-in impulse switch permits electrical sequencing with other equipment such as rotary tables. Manufacturer is Air Control Div., Dept. RS, Lehigh Inc., Easton, Pa.

Use ACTION Card opposite page 64. Encircle No. 5

Two chucks in one

The new Cushman air operated compensating chuck offers the user two distinct chucking advantages in one chuck body: (1) greater compensating action; (2) by "locking-out" the com-



pensating action and after being trued up on a spindle, this workholding device can be used as an ordinary self-centering air operated chuck.

Compensating action is accomplished by means of a lever cage, free to float in any direction and into which are pinned the jaw operating levers. Controlling or locking-out compensation is achieved through the use of three adjusting screws located in the periphery of the chuck body. These screws, depending upon how they are set, either permit or prevent lever cage motion, creating controlled compensation or self-centering chuck operation. The Cushman Chuck Co., Dept. DR, Hartford, Conn.

Use ACTION Card opposite page 64. Encircle No. 6

Drill attachment features mechanical positive feed

The Quackenbush positive feed drill attachment advances the drill a measurable depth with each revolution. This is important because as little as one revolution without cutting can work-harden the hole in many metals such as stainless steel, inconel, titanium, etc. Constant chip-load without surge or break-through is assured even when drilling sandwiched materials. Here-tofore, hydraulic or air actuated drill feeds have been used.

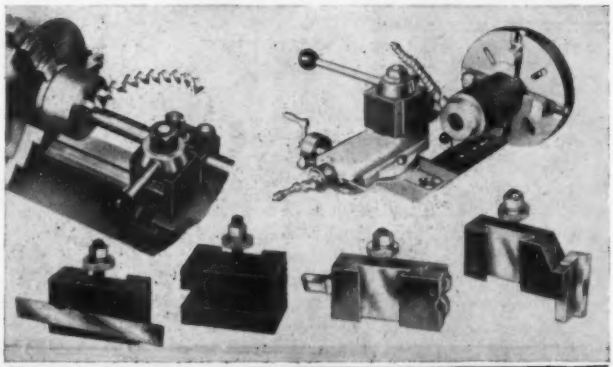
Two basic models are offered. The smaller, QDA-9, with drill capacity 3/16" and ⅝" maximum stroke, has a pressure actuated nose—engages feed automatically. The large model comes in two sizes, QDA-10 with 1¼" maximum stroke—5/16" drill capacity, and

GET THE MAXIMUM FROM YOUR LATHES
by using the ALORIS "Quick Change" Patented
TOOL POST and HOLDERS

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- GREAT REPETITIVE ACCURACY.
- RUGGED CONSTRUCTION.
- TESTED AND RECOMMENDED BY LEADING LATHE MANUFACTURERS.
- GREATER RIGIDITY.
- SAVES 90% IN SET-UP TIME.
- UNCONDITIONALLY GUARANTEED.

Write for catalog and price list.



ALORIS TOOL CO., INC. 131-37 SANFORD AVENUE FLUSHING 55, N. Y.

Circle No. 384 on Card, Opposite Page 65

IF You Want to Cut Production Costs . . .

THEN Without Machining, You Can:

Anchor Bushings in Drill Jigs
Secure Magnets in Fixtures
Anchor Shafts in Alnico Rotors
Align and Secure Shaft Bearings, etc.

Simple Procedures Described in Bulletin A1, Write for it TODAY.

To see these and many other applications, visit Booth No. 236, Design Engineering Show, Convention Hall, Philadelphia, May 14-17 and Booth No. 132-134 Foundry Show, Convention Hall, Atlantic City, May 3-9.

CERRO DE PASCO CORPORATION

300 Park Avenue, Room 1501, New York 22, N.Y.

Circle No. 385 on Card, Opposite Page 65

SHALLOW HOLES...DEEP HOLES
DRILL THEM FASTER, ALL BETTER
WITH A *Commander*
DRILL CHIP BREAKER

Ordinary Chips

Chip Breaker Chips

✓ Small Chips Permit 50%—400% Increase in Drilling Speeds
✓ Drill 10 Diameters or More in Depth Without Clearing Drill
✓ Better, Smoother, More Accurate Holes

Reciprocating action of the Commander Drill Chip Breaker breaks chips into small pieces that travel up drill flutes . . . permitting higher drilling speeds . . . doubles and triples production of shallow OR deep holes. Long chips which cause drill breakage, scored holes, slow jig and fixture loading, are eliminated—small, easy to handle chips flow up out of hole continuously, permitting coolant to reach cutting edge of drill. Assures longer drill life, more holes per sharpening, more holes per hour. **Your nearby COMMANDER Distributor has the Drill Chip Breaker and other Commander Production Tools.**

Commander **MFG. CO.**
4227 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Write **FOR CATALOG #851**
which describes Commander's Production Tools

Circle No. 386 on Card, Opposite Page 65

QDA-11 with 4" maximum stroke and ½" drill capacity.

The nose on these models is threaded for locking onto work and feed release on all models is automatic at end of stroke. Manual release from any position of stroke is a feature of the larger models. For high speed drilling in light manufacturing, the small model is well suited by using drill plates or jigs with its pressure actuated nose.

Attachments may be powered by a stationary source or by portable hand drills, pneumatic or electric, any make, with specific adapters. A. B. Quackenbush Co., Dept. KE, Glendale, Calif.

Use ACTION Card opposite page 64. Encircle No. 7

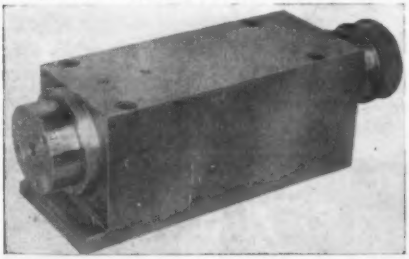
Two Spindles Introduced

The Pope super-precision, heavy duty boring spindle is capable of boring holes round within millionths of an inch and comes in both belt and motor driven types covering a wide range of speeds and horsepower.

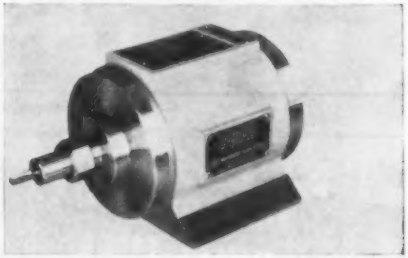
Other new Pope spindles are the high cycle, water cooled, oil mist lubricated, spindles for heavy duty grinding and milling at speeds up to 100,000 rpm. Pope Machinery Corp., Dept. DR, Haverhill, Mass.

Use ACTION Card opposite page 64. Encircle No. 8

Heavy duty boring spindle.



High frequency milling and grinding spindle.



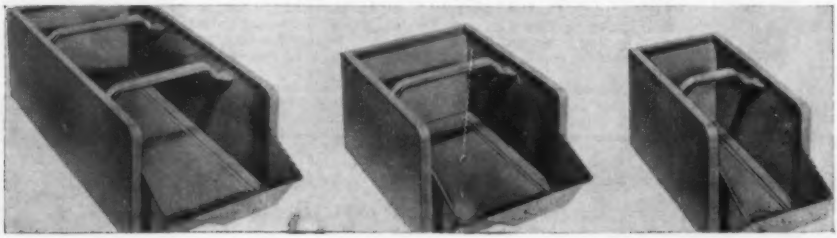
Materials Handling Containers

Three containers provide flexibility of arrangements for warehouse, stockroom, and assembly operations.

Designed primarily for use with the Bathey adaptor system and the modular assembly station and storage system, they also function as shop or tote pans. All corners and edges are doubly reinforced.

Two embossed runners are drawn in the bottom of the pan to act as guides for stacking. Coin-Box type hopper fronts give easy access and constant visibility. Bathey Mfg. Co., Dept. JS, Plymouth, Mich.

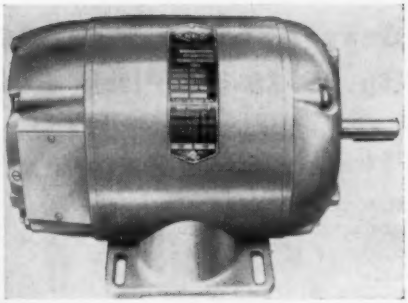
Use ACTION Card opposite page 64. Encircle No. 9



Fractional hp slip ring motors in small frame

The variable speed and step-by-step starting features of Slip Ring motors are now available as standard units in fractional ratings of ¼, 1/3, ½ and ¾ h.p. The small No. 66 frame size is approximately 2″ smaller in both length and diameter than the previously smallest size. Made by Reuland Electric Co., Dept. KE, Alhambra, Calif.

Use ACTION Card opposite page 64. Enclrcle No. 10



New Rotary Swaging Machines

The Torrington Co., Dept. MG, Torrington, Conn., has re-styled and redesigned its line of rotary swagers to meet modern industrial requirements and to increase operating efficiency. The new models incorporate provisions for improved noise control and for accommodating a wide variety of feed attachments. Their redesign makes better use both of working and storage space.

Swagers are claimed to eliminate the waste of ordinary machining while maintaining the full strength of metal.

Use ACTION Card opposite page 64. Enclrcle No. 11

Gear Checker Inspects Internal Gears Up to 18-in. Pitch Diameter

A new model SIG-18-in. Red Ring gear checker for inspecting spur or helical internal gears up to 18-in. pitch diameter is now available from National Broach & Machine Co., Dept. JS, 5600 St. Jean Ave., Detroit 13, Mich.

The new model checks internal helical and spur gear tooth-to-tooth spacing, pitch or root diameter eccentricity and size as well as parallelism of spur gears from 2 to 48 diametral pitch having pitch diameters from 2 to 18-inches.

Basically the machine consists of a cast iron base that supports a precision ball bearing vertical work spindle. The head that checks tooth spacing, size and eccentricity is mounted on an adjustable overarm that is supported by a vertical cast iron member which is slide-mounted on the base and raised up and down by a hand-wheel-controlled rack and pinion counter balanced drive.

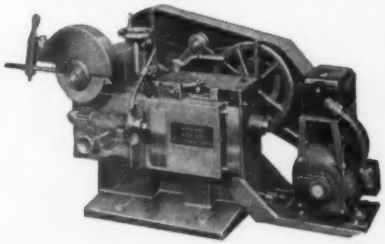
The parallelism checking head for internal spur gears is mounted on vertical ball slides in a casting that slides in and out on a sub-plate bolted to the top of the base checker. An adjustable gear tooth locator mounted in a T-slot in the top face of the base is provided to approximately position the gear tooth space and prevent skipping teeth when indexing.

The tooth spacing and eccentricity checking head spindle has an adjustable spring load that advances the checking head to the tooth space to be checked. A small hand lever at the front of the checking head retracts the head during checking and also locks it back out of contact with the gear teeth during setup operations.

The gear checker occupies a 30 by 40 in. floor space. Height to the top of the base is 40-in. Maximum diameter of internal spur and helical gears that can be checked is 26-inches.

Use ACTION Card opposite page 64, Encircle No. 12

Wardwell Saw Grinder, "35T"



Sharpens Metal Saws in Gangs . . . Saves Money

Sharpens up to 115 saws .015" thick at one time, better than new. Includes slitting and screw slotting saws, and milling cutters up to 5½" diameter.

Completely automatic. All you do is start the machine. It does the rest.

"35T" saves money for you by greatly increasing saw life. You owe it to yourself to investigate this remarkable machine.

Write for Bulletin 35T

WARDWELL MANUFACTURING CO.
3807 Ridge Road Cleveland 9, Ohio

Maker of largest line of saw and tool sharpening machines

Circle No. 387 on Card, Opposite Page 65

IT'S Economy ALL THE WAY!

— when you order your duplication requirements for these Standard Items . . .

A. G. D. PLUG & RING GAGES

"TRU-LOC" Adjustable Adapter Sleeves and Nuts

A. S. A. DRILL JIG BUSHINGS

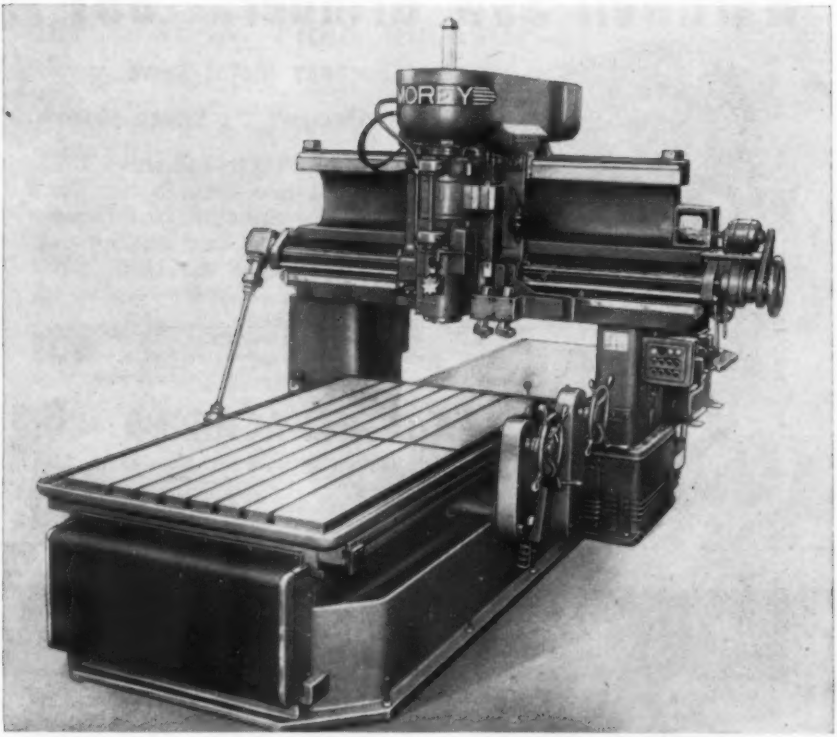
"Economy" stocks always complete to assure immediate delivery. Worn-out plugs and ring gages salvaged at low cost.

Ask about the new "Economy" Extended O.D. Symbol Range. Dimensional Data Sheet No. 7-A Upon Request.

ECONOMY TOOL & MACHINE CO.
1829 SOUTH 68th STREET
MILWAUKEE 14, WIS.

Circle No. 388 on Card, Opposite Page 65

Profile Miller Introduced



The Morey 50MA profile miller is available with table from 48" x 48", in increments of 2-feet, up to 144" in standard sizes.

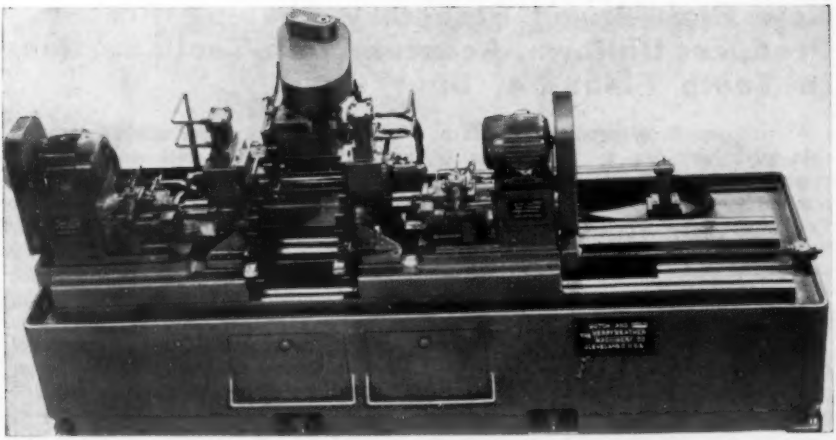
The machine is equipped for hand profiling of ferrous and non-ferrous metals. Also available are power feeds with speeds up to 320", power feeds for transverse movement, vertical tracing, 360° tracing or three-dimensional tracing systems. Morey Machinery Co., Inc., Dept. MG, 383 Lafayette St., New York 3, N.Y.

Use ACTION Card opposite page 64. Encircle No. 13

Transfer Machine Combines Cut-Off and Double-end Operations

Automatic stock cut-off simultaneous with double-end machining is combined in a new unit built by the Motch & Merryweather Machinery Co., Dept. RH, 888 East 70th St., Cleveland 3, O. The machine embodies automatic feed for bar stock to a circular sawing cut-off station, and transfer facilities to two opposed secondary machining heads.

Stock is fed to the stock shop which is set for a predetermined length. It is retained in a vise during the cut-off operation and also in two transfer carriers. The transfer mechanism consists



of two continuous chains to which the carriers are fastened. The cut pieces are indexed forward to the double end machining station. At this point the pieces are positioned for endwise location by hardened shoes and lifted from the carrier by clamps and held during the double-end machining operation. On completion of the work the parts are lowered to the carriers by opening of the vises and the index forward carries them to the discharge position.

Use ACTION Card opposite page 64, Enstrale No. 14

INDEXING TURNTABLES

CAMS

Eisler makes over 100 different types of indexing mechanisms for spraying, glass insulators, melting and glass glazing with rotating stations and motorized or hand operated. Rotating tables of all kinds for over 35 years. We supply any part or complete equipment and we make special turntables and cams to your specifications. You are invited to see our showroom and see for yourself our many models on display. Write or call for our new catalog No. 88-55.

CHARLES EISLER JR., PRESIDENT
EISLER ENGINEERING CO., INC., 762 So. 13th Street, Newark, N. J.

Circle No. 389 on Card, Opposite Page 65

New High Speed Planetary Shaving Process Produces Uniform, Accurate Thin-Tooth Sections In Tooth Flanks of Spur Gears

A process that produces uniform thin-tooth sections in the flanks of spur gear teeth by a planetary shaving method has been developed by National Broach & Machine Co., Dept. JS, 5600 St. Jean Ave., Detroit 13, Mich. The process is carried out on the Model PSA-4 in. Red Ring planetary gear shaving machine.

A variety of edge shapes can be produced. The thin tooth section can be produced in either one or both sides of all of the teeth of a spur gear by the process as desired. The profile closely approximates an involute form and is usually within required tenths of a thousandth involute profile tolerances.

The shaver has a hardened and ground, hss cutter that resembles an internal spline. A gear whose teeth are to be thinned in a given flank section is mounted in a three-jaw gear tooth chuck in mesh with the cutter. The work gear rotates around the cutter centerline during the shaving process.

Since the cutter has single cutting edges, which alternately thin first one side of all the teeth and then the other, a timed relationship is maintained between the gear and the cutter. This is achieved by locating the gear radially in the toothed chuck jaws and rotating the chuck about the cutter centerline with a master gear and internal gear assembly located in back of the cutter.

At the loading position, the gear is located in such a manner that it is in backlash position with respect to each of the cutting edges of the planetary shaving cutter. When the automatic cutting cycle is initiated, the gear axis is rotated about the cutter centerline and the cutter is fed tangentially in increments, first in one direction, next back to backlash position, then in the opposite direction and finally back to backlash position for unloading.

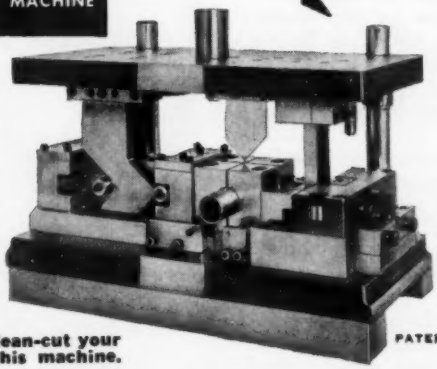
Use ACTION Card opposite page 64. Encircle No. 15

Model PSA-4-in. planetary gear shaver.

Unloading a finish shaved truck transmission clutch gear.

Cuts Tubing to Accurate Lengths in SPLIT SECOND TIME!

VOGEL TUBE CUT-OFF MACHINE



PATENTED

LENGTHS of ½ inch or more are accurately cut to ± .010" with each stroke of press—actually less than ⅓ of a second or faster than any other known method. In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.

Unit No. 12 accommodates tubing up to ½" O.D. with 3/32" wall; the No. 2 takes tubing up to 2" O.D. with ⅛" wall.

Ask for sample showing how clean-cut your tubing can be sheared with this machine.

VOGEL TOOL AND DIE CORPORATION
1825 NORTH 32nd AVENUE, MELROSE PARK, ILLINOIS

Circle No. 390 on Card, Opposite Page 65

CONCENTRIC LIVE CENTERS *the original, patented*
spring loaded live center

FASTER SPEEDS
AUTOMATIC THRUST ADJUSTMENT

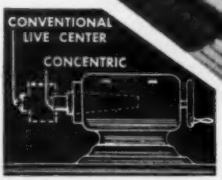
Smaller turning radius gives much higher RPM rate than ordinary live centers.

Spring loaded spindle gives automatic tail stock adjustment.

LESS OVERHANG MEANS MORE RIGIDITY. . MORE WORKING RANGE

GREATER LOAD CAPACITY
LONGER LIFE
JAM PROOF

Write today for complete information



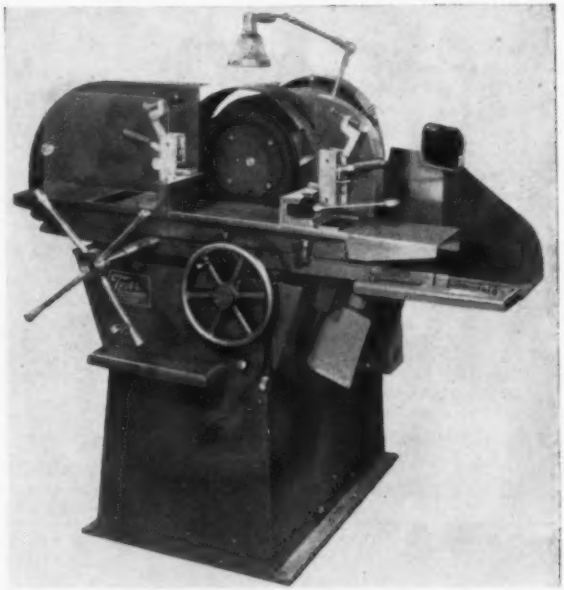
Pat No. 2,520,473

CONCENTRIC TOOL CORP 2486 Huntington Drive, San Marino, Calif

Circle No. 391 on Card, Opposite Page 65

Facing Machine Reduces Machining Time on Flat Surfaces

A new machine that produces flat and square surfaces on any workpiece, the Thiel facing machine, has a 14" cup-shaped grinding wheel mounted perpendicularly to the table. Workpieces need only one flat surface to be held to the table. Unique squaring and clamping blocks, sliding in table keyways, hold the work squarely rigid. Operating at 1400 rpm, the grinding wheel faces cold or hot rolled steel, tool steels, steel castings, and all nonferrous alloys.



When greater stock removal is required, one or two progressive-cutting face mills may be used. A 6" dia., 12-blade milling cutter is used for ferrous alloys, and will remove up to ¼" of stock in a single pass. A 12" dia., 18-blade cutter is used for nonferrous metals, and will make a ⅜" cut in one pass. Special gripping fixtures for holding non-ferrous plate, and magnetic chucks for holding thin ferrous pieces are also available. Eastern Tool & Engineering Co., Dept. JS, 23672 Schoenherr Rd., East Detroit, Mich.

Use ACTION Card opposite page 64. Encircle No. 16

Shell end mill and face milling cutters

Eager Beaver milling cutters claim faster stock removal and better finish, made possible by proper cutting angle and ample chip clearance.

With the blades changed to the proper grade of carbide, cutter can be used for milling all ferrous and nonferrous materials. Low replacement and maintenance costs are a special feature and quick, easy blade adjustments are possible. Blade tips contain adequate carbide for heavy-duty work. Beaver Tool & Eng. Corp., Dept. JS, Box 429, Royal Oak, Mich.

Use ACTION Card, opposite page 64. Circle No. 17

ACE SETS THE PACE!

Now Offers You The

LARGEST DELIVERABLE SELECTION

more than 22,000 SIZES, TYPES AND SPECIFICATIONS

A.S.A. & ACE STANDARD DRILL BUSHINGS

Regular, Serrated, Castable, Micro and Super-Sizes . . . plus Specials
Your "Specials" may be ACE "Standards"—ask for them!

Always Specify **ACE--**
"STANDARD OF THE INDUSTRY"

ACE

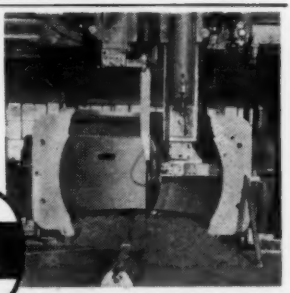
ACE DRILL BUSHING CO., INC.
5407 Fountain Ave., Los Angeles 29, Calif.

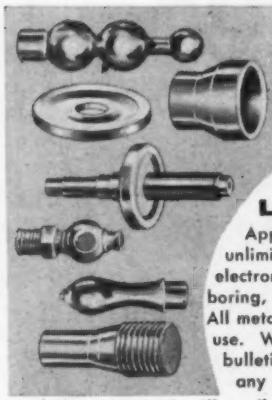
Circle No. 392 on Card, Opposite Page 65

Amazing tool does

CONTOUR TRACING on BORING MILLS and PRECISION DUPLICATING

on Lathes or Planers





Lehigh
TRACER-TOOL
PROFILE-TRACING LATHE ATTACHMENT

FULL COST LESS THAN $1000

Application and uses are practically unlimited. No complicated hydraulic or electronic controls. Does facing, grinding, boring, steps, threading—unlimited radii. All metals. Thousands in long, satisfactory use. Write for illustrated engineering bulletins and experienced assistance on any duplicating problem—anywhere!

Tolerance of ± .002 is maintained by Lehigh TRACER-TOOL in boring this huge water-cooled bearing housing and machining the inner bearing. TRACER-TOOL can be removed from boring mill and be in operation on a lathe or planer in less than one hour.

FRED H. SCHONBERGER, Inc.
P. O. Box 233
Nazareth, Penna.
National Distributors

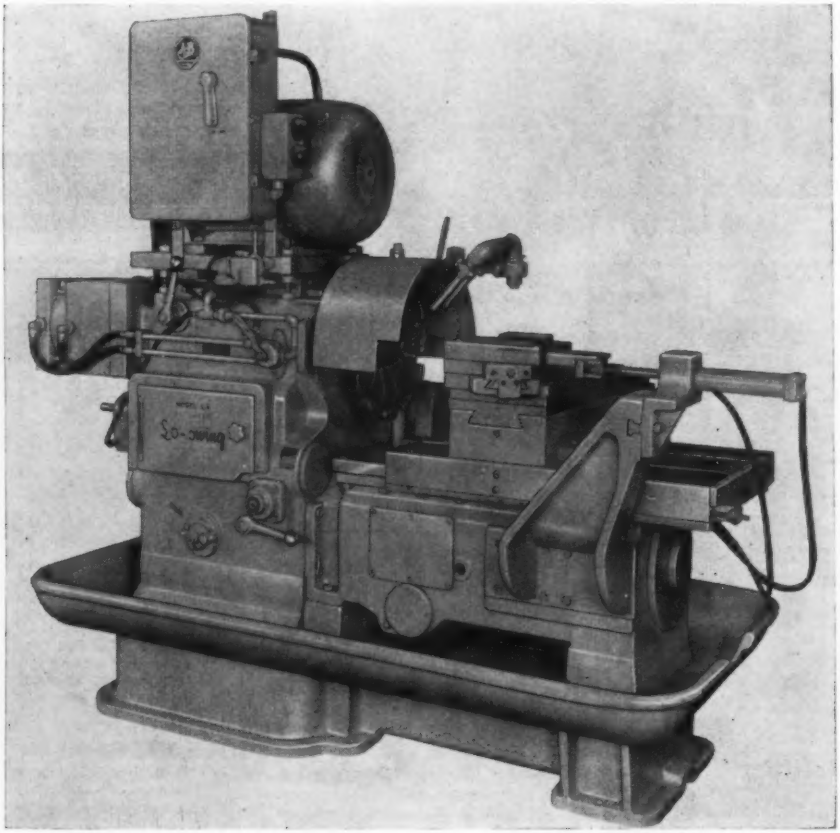
★ *Some territory still available for qualified representatives.*

Circle No. 393 on Card, Opposite Page 65

Platen Type, Automatic Lathes are Versatile, Time-Saving

Three new Seneca Falls platen type automatic lathes are designed principally as chucking machines adaptable to a wide variety of work requiring large swing capacity, high spindle speeds, multiple tooling and fast cycling operation. They are fully automatic, cam operated, and offer Lo-swing principles of sufficient mass and adequate tool support. All three may be equipped with automatic loading and transfer equipment.

The tool blocks are mounted on a power-operated cross slide, the movement of which is controlled by the "quick change-over mechanism," eliminating the necessity of changing cams for variations in the length of stroke. The cross slide base is keyed and bolted to the platen and is adjustable longitudinally by tee slots for quick positioning. The automatic longitudinal feed for the platen is obtained through a



INCREASE PRODUCTION...

Above is shown a 6M Fen Automatic Wrench operating a 26" heavy duty chuck.

• • •

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

ELIMINATE
"WRENCH WRESTLING"

You can put the advantages of the Fen Automatic Wrenches to your work right in your own shop on machines already in operation, or specify them on your new standard or automatic machines.

THE FEN MACHINE COMPANY
28914 Lakeland Blvd.
Wickliffe, Ohio

Circle No. 394 on Card, Opposite Page 65

barrel cam housed in the bed of the machine.

Model N has a swing of 11" over the platen, Model LN, a swing of 18" and the Model AN, a swing of 24". The horsepower capacities are 5, 20 and 40, respectively. Seneca Falls Machine Co., Dept. RS, Seneca Falls, N.Y.

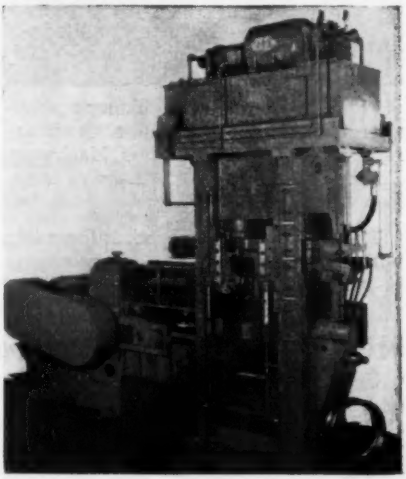
Use ACTION Card, opposite page 64. Circle No. 18

Automatic rim roller

A new design McKay rim roller, for the automatic manufacture of wheel rims, feeds and transfers the rims into and out of the machine in a straight line by electrically controlled, pneumatically operated conveyors.

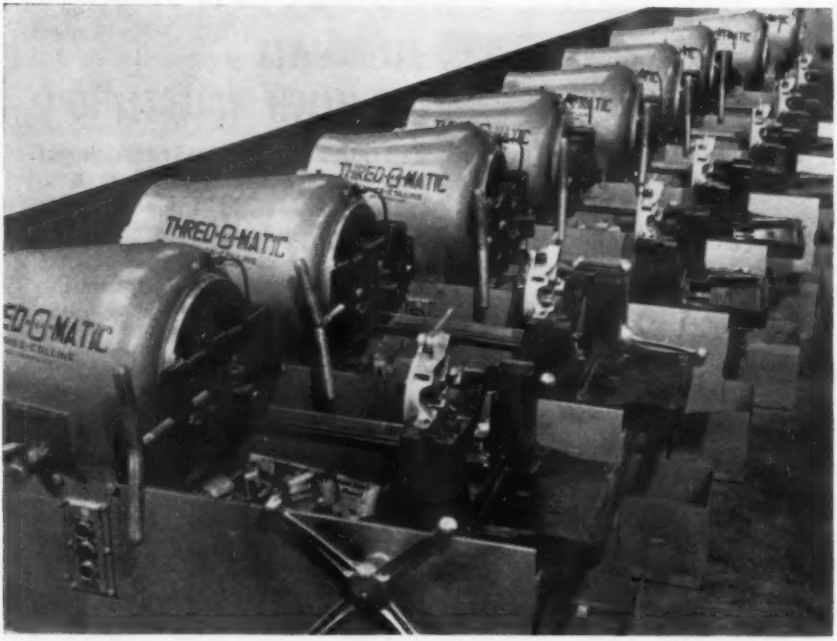
The rim is mounted automatically on the work rolls. Manual loading is eliminated.

By supporting both the bottom and top work roll shafts during the rolling cycle, the roller eliminates deflection of the roll shaft due to non-support. During transfer, the bottom roll retracts automatically on its axis out of the rim's path. The McKay Machine Co., Dept. RH, Youngstown 10, O.



Use ACTION Card opposite page 64. Encircle No. 19

Pipe, Bolt, Conduit Threaders Adapted for Air Force Use



Thred-O-Matics with changes engineered for Air Force requirements are now available from Collins Machinery Corp., Dept. KE, 5474 Alhambra Ave., Los Angeles 32, Calif.

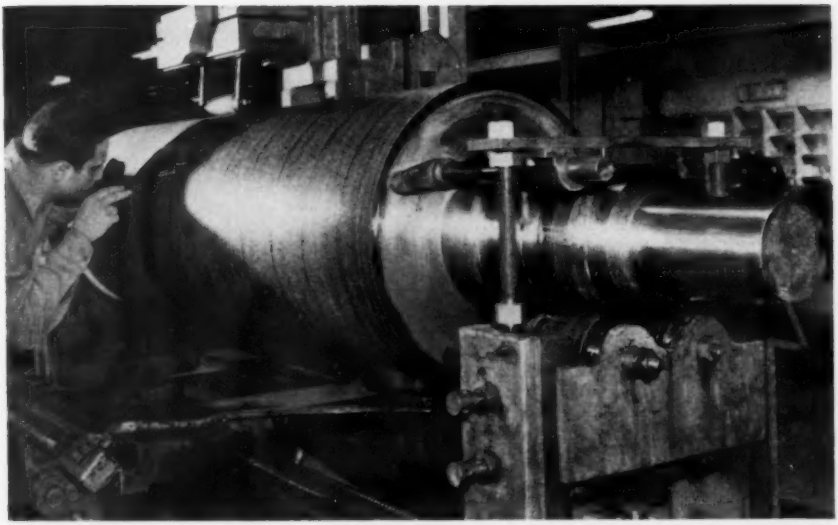
These pipe, bolt and conduit threaders with automatic chuck will now grip ¼-inch to 4-inch pipe and ⅜-inch to 3-inch bolt stock. Chamfering and grooving devices have also been engineered, and die heads have been redesigned to use scroll adjustment die heads with five segments to give fine quality threads. Automatic built-in oil flow prevents damage to dies caused by lack of coolant.

Use ACTION Card opposite page 64. Encircle No. 20

New Techniques Improve Embossing Rolls

Under new precision methods of engraving, Modern Engraving & Machine Co., Hillside, N.J., produces perfect mates in forged steel rolls for embossing sheet materials. Forged and machined rolls ready for engraving are supplied by Standard Steel Works Div. of Baldwin-Lima-Hamilton Corp., Dept. RS, Burnham, Pa., in sizes ranging up to 20-in. diameter and six feet long. Rolls up to 12 feet in length are supplied in smaller diameters. Production of perfect mates means that the most complicated design is matched, cleared, and crowned to emboss on one or both sides.

In the flame hardening process the roll is rotated around a vertical axis



while a concentric ring of oxy-acetylene flames, followed by quenching water jets, rise from end to end of the engraved rolls at a rate that is regulated electronically by reflected radiant heat.

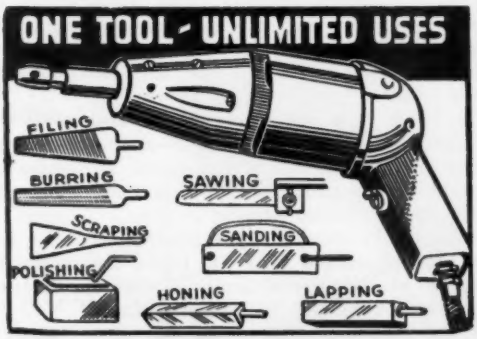
Use ACTION Card opposite page 64. Encircle No. 21

B-R-E-A-K...
Hand Finishing Bottlenecks

with
Portable • Electric Reciprocating Tools

These handy tools will cut out many tedious hand filing and finishing operations — Increase Production — Produce Uniform Work.

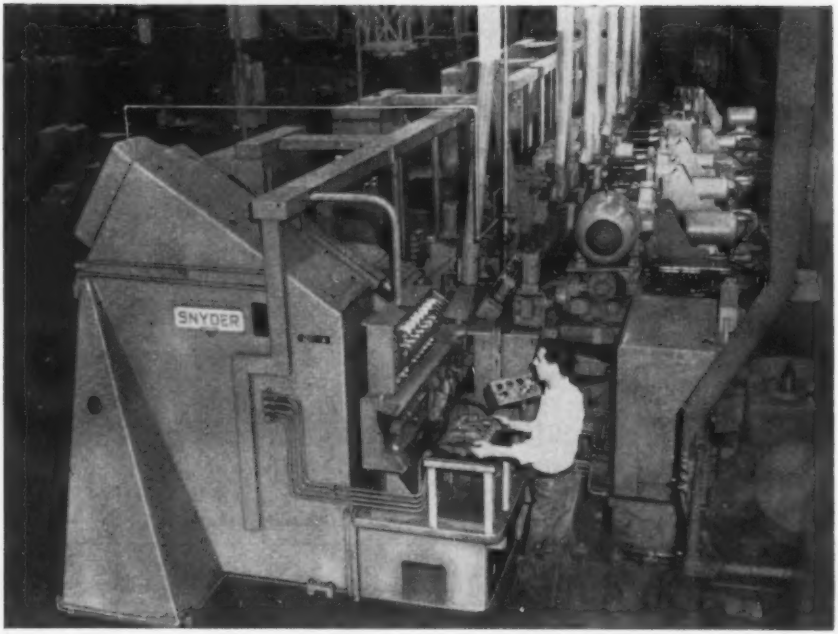
Light in weight — Delivers 1/8" or 3/8" fixed stroke at 1000 strokes per minute — Operates on 110 volts AC or DC.



ACME TOOL COMPANY
71 WEST BROADWAY **NEW YORK 7, N. Y.**

Circle No. 395 on Card, Opposite Page 65

Transfer Machine Mills, Drills, Taps Part Without Turnover



A compact Snyder segmented transfer machine includes a unique vertical angular rail arrangement to avoid turnover operations and utilizes horizontal way units in the complete milling, drilling and tapping of a cast iron automotive engine intake manifold. By turning the intake manifold up on edge and transferring it from station-to-station with a transfer bar arrangement, all machining operations on the part are performed without turning it over.

The intake manifolds are transferred on vertical angular rails that travel the length of the hydraulically operated machine. Previously milled flat surfaces on the manifolds contact the rail surfaces. Retaining strips on top and bottom ways prevent the manifolds from falling away from the rails.

The seven-segment, 20-station, 54-ft. long machine produces 68 manifolds per hour at 80 percent efficiency. Snyder Tool & Engineering Co., Dept. JS., 3400 E. Lafayette Ave., Detroit 7, Mich.

Use ACTION Card opposite page 64. Encircle No. 22

Drill unit controls added by user

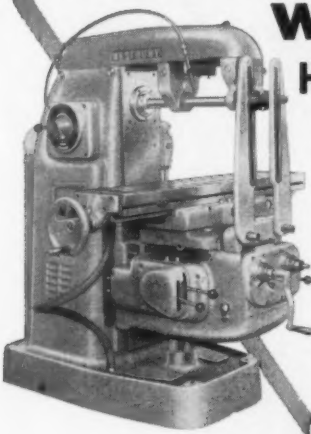
Rotafeed automation machine components are now offered on a selective "Do it Yourself" basis, enabling the user to buy drill units and adding such controls as he may want to use from his own inventory or that he may elect to use from the Rotafeed components.

Drilling machines can be mounted singly or in groups at any angle on an oil table to give completely automatic production on drilling, reaming, tapping, spotfacing, counterboring, burring, and spinning operation. They are available

GET MORE POWER, SPEED, CONTROL

WESTBURY

Horizontal Mills 1-U 2-U 3-U



Heat-treated, hardened spindle; all moving parts designed to withstand overloads in excess of 100% — Spindle mounted on adjustable tapered roller bearings — Dial and hand control for selecting and reversing — Splash lubricated spindle gear box, extra gear pump for added safety — Power feed and rapid traverse in all directions — Climb milling — Special safety devices prevent operating errors — All ways handscraped — Single lever engages rapid traverse to all movements.

- 12 speeds
- 28 to 1100 rpm or 35 to 1600 rpm
- Climb milling
- Tapered roller bearings
- Hand scraped ways

MASERATI

Maserati Corporation of America
Westbury, L. I., N.Y.

Distributors in principal cities

Write, wire or telephone for descriptive literature

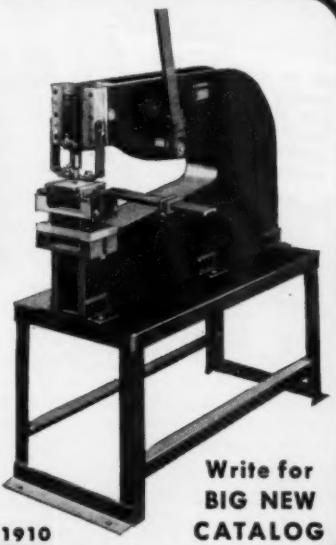
Circle No. 396 on Card, Opposite Page 65

A GREAT LITTLE 8-TON LEVER PRESS

WHITNEY-JENSEN
Nos. 31/32/33/34
DEEP THROAT LEVER PRESSES

Wonderful for Odd Jobs and Short Runs

CAPACITY: ½" HOLE THRU
3/16" MILD STEEL



WHITNEY METAL TOOL CO.
718 Forbes St., Rockford, Ill. Since 1910

Write for BIG NEW CATALOG

Circle No. 397 on Card, Opposite Page 65

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

IMMEDIATE DELIVERY FROM STOCK

3AT, 3C
1A, 4C
5C

KLUTCH-KOLLET
Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

(60 to 50)

All collets in hexagon, square and round.

FOR ATLAS • LOGAN • SOUTH BEND
CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR ½" cap.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

HAND DRAWBAR ½" cap.

LIVE CENTER (Ball Bearing) Double sealed for accuracy.

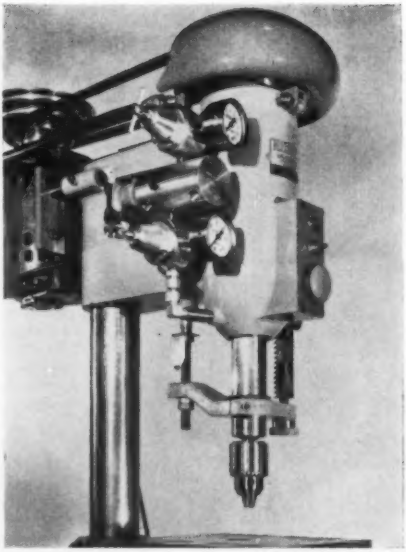
KASSON Precision

KASSON Precision products are guaranteed unconditionally for accuracy, fit and long life. Your dealer should have them . . . write us for literature!

KASSON DIE AND MOTOR CORP.
32-14 Northern Boulevard
LONG ISLAND CITY 1, N Y

Integrity Since 1919

Circle No. 398 on Card, Opposite Page 65

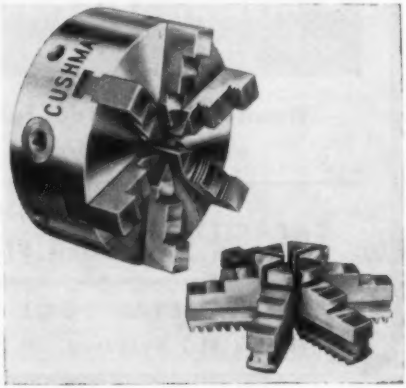


in three sizes: ½", 1", and 1-½" drill capacity. Manufactured by Rotafeed Co., Detroit, Mich. Distributor is Robert F. Brown Machinery, Inc., Dept. JS, 3100 Grand River, Detroit 8, Mich.

Use ACTION Card opposite page 64. Encircle No. 23

Chuck permits adjustment to .0005"

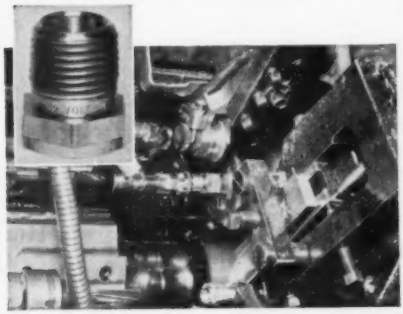
The Cushman Accra-Set chuck has been especially designed for minute



(Advertisement)

OVER 8-MILLION SCREW MACHINE PARTS MARKED AUTOMATICALLY AT TWO CENTS PER THOUSAND

Automatically marking over 8-million parts such as these automotive couplings (inset) with a 21-character impression at a total cost of less than two cents per 1000 parts for complete marking equipment was accomplished by employing a single standard Model 500-C automatic roll marker and die manufactured by New Method Steel Stamps, Inc., 147 Joseph Campau, Detroit. Marking equipment is still in perfect condition.



According to J. B. Cote, President of Berlew Products, Inc., Ferndale, Michigan, total maintenance cost on the several marking operations consisted of 90 cents for a new reset spring during the 4½ years the lone marking unit has operated on the 1¼" Acme-Gridley shown tooled for the job. Cote indicated that the cost of marking these products on a secondary operation would have been many times greater due to time and labor costs involved, reduced production output and increased losses from imperfect marking.

The 8-million parts were machined from ⅞" hexagonal brass bar stock and were marked with a single roll die which is still in continuous operation. Use of an offset roll die permitted marking within 3/64" of the hex head. Versatility of the roll holder permits marking of many different parts with a single unit, using standard interchangeable New Method roll dies.

Marking one part every six seconds, the automatic marking unit turned out the 8,000,000 parts in a period equal to over 4½ years of continuous operation, 8 hours per day and every day of the month.

Circle No. 399 on Card, Opposite Page 65

accuracy which must be held to very close limits. Adjustment is simple, quick and the chuck will repeat to .0005" total indicator reading.

The adjusting mechanism consists of four screws equally spaced about the periphery of the chuck body and placed on a compound angle. They always make full end face contact with hardened steel balls, which have one flat plane to provide this face contact and which are free to find their own pivotal position in the rigidly mounted back plate of the chuck. Adjustment of the screws against the balls shifts the chuck body carrying the jaws, scroll, and pinion to dead center and at the same time draws the body solidly against the back plate, as well as positively locking it against rotational slippage. Thus, the body is rigidly and centrally positioned with the assurance that no slippage or shifting will occur during heavy interrupted cuts, sudden stops and starts of the machine spindle, or in its use on indexing devices.

To adjust the chuck, it is not necessary to loosen or tighten any screws other than the adjusting screws. No binding or attaching of assembly screws is involved. Chucks are available with three or six jaws in 6", 8", and 10" sizes. The Cushman Chuck Co., Dept DR, Hartford, Conn.

Use ACTION Card opposite page 64. Encircle No. 24

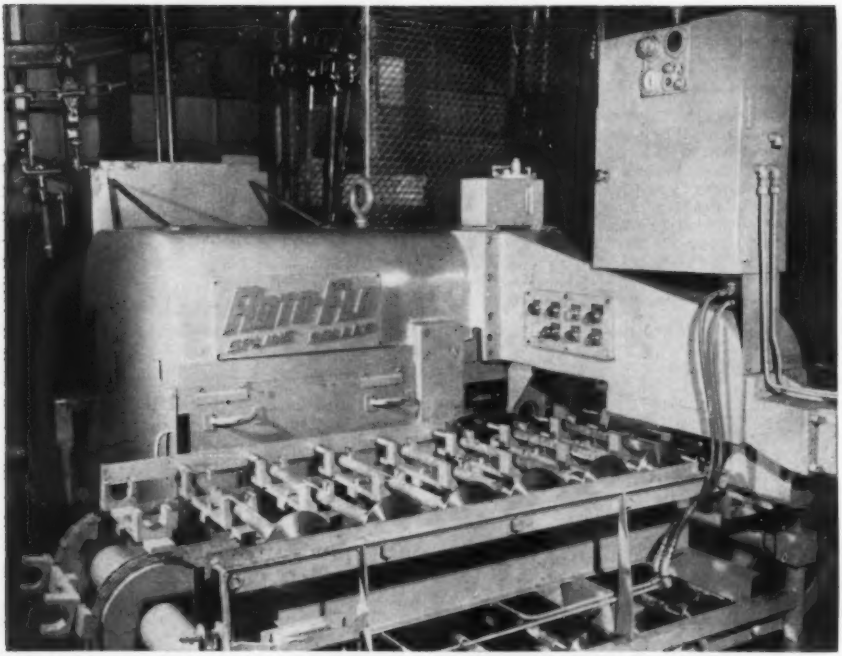
Measuring comparator

The 10" Model 100 McPherson measuring comparator is accurate to one micron (.000039") over ten inches of travel but can be read to fractions of a micron. Underneath and vertical illumination makes it possible to measure translucent, transparent, and opaque objects.

Standard or special holding fixtures can be supplied. Paul M. McPherson Precision Instruments, Dept. JP, Acton, Mass.

Use ACTION Card opposite page 64. Encircle No. 25

Rolling Splines on Rear Axle Shafts



The Roto-Flo process of cold rolling splines developed by Michigan Tool Co., Dept. JS, 7171 E. McNichols Rd., Detroit, extends cold forming to accurate machined parts through the use of four machines installed at the Ford Motor Company's Mound Road plant.

The cold rolling of rear axle shafts by the Roto Flo process is claimed to provide manufacturing advantages. Quality is improved both from the standpoint of tooth strength and surface finish. Rolled splines are produced with 3 to 6 micro-inch surface finish. About 150,000 splines are rolled per grinding of the forming rack. New racks made of special alloy steels promise an even longer production life before grinding is required.

The operator takes the parts from the overhead trolley conveyor and loads them into V-shaped carrier slots at the loading station. Once loaded, further operator attention is not required through the work cycle.

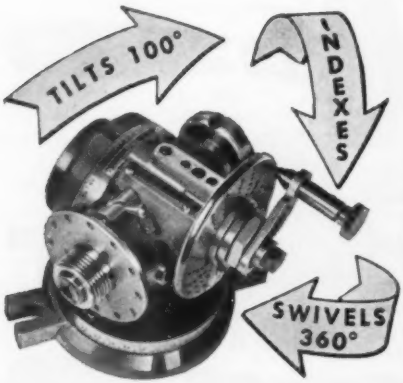
Production rate for the automated equipment is about 300 per hour for each machine at 100 per cent efficiency.

Use ACTION Card opposite page 64. Encircle No. 26

Carbide has high edge strength

Grade NS-3 carbide for steel-cutting applications has been developed for general purpose machining and milling of steel forgings, castings, weldments, plate and highly abrasive steels. Exceptional high edge strength and resistance to shock and chipping are claimed. Newcomer Products, Inc., Dept. RH, Latrobe, Pa.

Use ACTION Card opposite page 64. Encircle No. 27



FOR FASTER PRODUCTION

THE ELLIS

DIVIDING HEAD

Although it is built to fine instrument standards, the ELLIS is a really *rugged* tool room or production tool that's designed for unusual versatility. Its universal motions — swiveling in two planes — will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!

NICHOLS MORRIS CORPORATION

76-G MAMARONECK AVE.

WHITE PLAINS, N. Y.

Circle No. 400 on Card, Opposite Page 65

Keep a Close Check On Accuracy With SUNDSTRAND Bench Centers

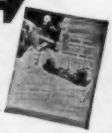
Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data



covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 468.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.

2535 Eleventh Street, Rockford, Ill., U.S.A.

Circle No. 401 on Card, Opposite Page 65

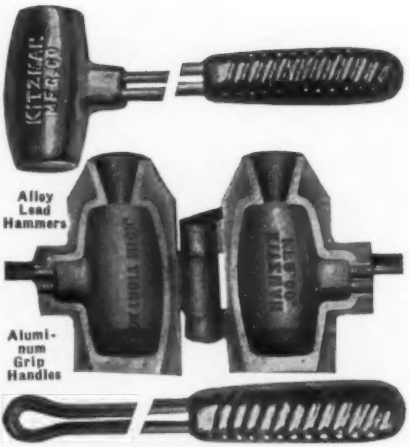
Write for new catalogue of Carbide and High Speed Rotary Files and Burrs.

Save Dollars by Using Our Re-Sharpening Service

MFGR'S OF
ROTARY FILES
COUNTERSINKS
HIGH SPEED CUTTERS
TUBE BURRING FILES

BEAVER
ROTARY FILE COMPANY
404 E. SLAUSON AVE.
ADams 1-0165
LOS ANGELES 11, CALIF.

Circle No. 402 on Card, Opposite Page 65



Hinged Hammer Moulds

1, 2½ and 5 lb. sizes—order your alloy lead hammer requirements from your machine tool supply house

or direct from:

KITZMAN MFG. CO.
13061 Hartwell Ave. Detroit 27, Mich.

Circle No. 404 on Card, Opposite Page 65

DRYS FAST-RESISTS OIL
WON'T CHIP, CRACK OR FLAKE OFF!

Circle No. 403 on Card, Opposite Page 65

SPRING LOADED LIVE CENTER

Eliminate excessive overhang of your center. Use the accurate, rugged, reliable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write for complete information.

*Reg. U.S. Pat. Off.

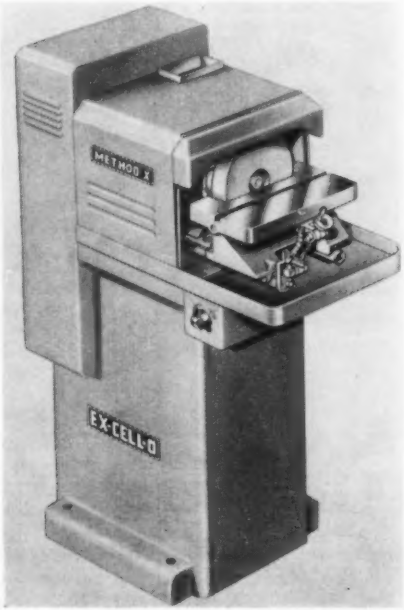
*NIROL MANUFACTURING COMPANY
900 H'WAY 22, N. PLAINFIELD, N. J.

Circle No. 405 on Card, Opposite Page 65

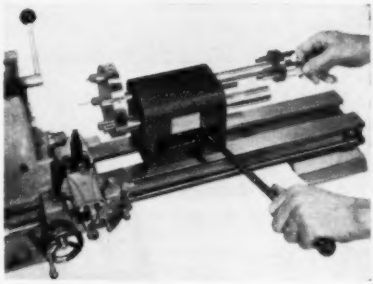
Carbides sharpened by electrospark machining

Sharpening carbide tools by electrospark machining instead of abrasive wheels, the "Method X" process, is available in the Style 43 tool sharpener.

Designed primarily for off-hand sharpening of single-point solid carbide and carbide-tipped tools, the machine functions without diamond wheels or abrasives. Its operating principle is relatively simple. For a wheel, the machine uses a ten-inch cast-iron disc, connected to serve as the negative terminal of an electric circuit. Similarly connected, the tool itself becomes the positive electric terminal. A semi-solid dielectric film applied to the disc provides a spark gap of proper distance between those terminals. As the tool is oscillated across the wheel face, current pulsations are released as spark discharges. The high current densities of the single-pulse discharge overcome the



NEW! **Precision Drilling Head**



HAWKEYE CONCENTRICITY HEAD SAVES TIME AND MONEY

Even a Beginner Can Learn To Operate In Only A Few Minutes With Super Accuracy!

Accurate Micro Feed Gives The Operator Perfect Control Of The Smallest Drills Made With Practically No Breakage!

Hawkeye Model LH-200 eliminates all guesswork. Look at some of its many features: Direct Master Pilot with ¼" vertical adjustment.

Fits any engine or bench lathe with 6" swing and up.

Will take std. 5/8" tool holders. Head weighs 22 lbs. with length of travel approx. 3".

Positive lock stop with fast, accurate setting. Amazing reports from some of the leading instrument manufacturers on the Hawkeye Head.

Write for Descriptive Literature To:

HAWKEYE SPECIALTY CO. *Pat. Pending*

Dept. MTB, 1532 W. 14th Street
Davenport, Iowa

Circle No. 406 on Card, Opposite Page 65

Gammons
* REAMERS

Originators and Manufacturers of Helical Reamers and End Mills

Helical Taper Pin Reamers Shipped by Return Mail

THE GAMMONS-HOAGLUND COMPANY

400 Main Street, Manchester 8, Conn.

tensile strength of the material and a minute particle is removed from the tool at this point. The resulting crater depth and diameter are proportionate to the energy discharged per pulse.

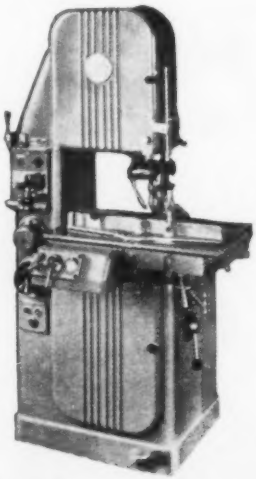
This tool sharpener is being manufactured by the Ex-Cell-O Corp., Dept. JS, 1200 Oakman Blvd., Detroit 32, Mich., under license granted by the Method X Co., a subsidiary of Firth Sterling, Dept. RH, 3113 Forbes St., Pittsburgh 30, Pa. Sales will be handled by both Firth Sterling and Ex-Cell-O.

Use ACTION Card opposite page 64. Encircle No. 28

Vertical metal cutting bandsaw

The Kolle Model K-16 contour cutting vertical metal cutting bandsaw has infinitely variable cutting speeds from 33 to 2400 fpm. It features a table that swivels 15° on all four sides.

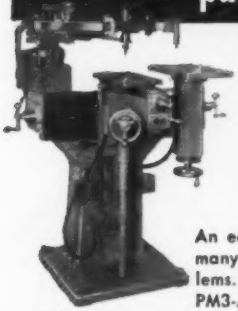
Specifications: Diameter of saw wheels, 15¾"; throat depth, 15"; cutting thickness, 10"; size of table, 22" x 23⅝"; motor horsepower, 1½.



Attachments: hydraulic feed with roller table; circular cutting; cutting-off and mitering. Aaron Machinery Co., Inc., Dept. MG, 45 Crosby St., New York 12, N.Y.

Use ACTION Card opposite page 64. Encircle No. 29

3-Dimensional panto-miller



Accurate pantographic milling on either flat or curved surfaces.

New

CAPACITY
SENSITIVITY
ACCURACY
CONTROL

An economical answer to many production problems. Send for Bulletin PM3-A.

2-Dimensional panto-miller

Versatile and dependable for continuous service, the J&B "Panto-Miller" 2A:

ENGRAVES
PROFILES
DIE CUTS
MILLS

Write for Bulletin PM2-A.

3-WAY Indexing Trunnion

Simple, Rapid, Positive positioning of workpiece or jig for all angle Drilling, Tapping, or Counterboring. Available with Chuck, Faceplate, or Right-Angle Adaptor Plate. Complete with Station Selector. For details, ask for Bulletin IT3-A.

J&B
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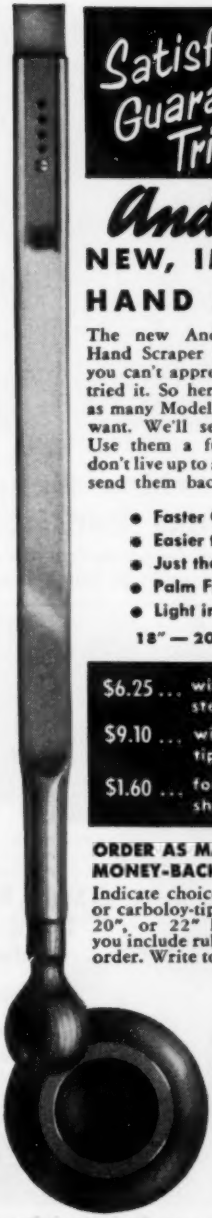
JOHNSON & BASSETT INC.
PRODUCTION TOOL DIVISION
WORCESTER, MASSACHUSETTS

Circle No. 408 on Card, Opposite Page 65

Satisfaction Guaranteed Trial Offer



Anderson
NEW, IMPROVED HAND SCRAPER

The new Anderson Model 5-D Hand Scraper is the kind of tool you can't appreciate until you have tried it. So here's our offer: Order as many Model 5-D scrapers as you want. We'll send them promptly. Use them a full week . . . if they don't live up to all your expectations, send them back to us for refund.

- **Faster Cutting**
- **Easier to Use**
- **Just the Right Spring**
- **Palm Fitting Grip**
- **Light in Weight**

18" — 20" — 22" lengths

$6.25 ...	with high speed steel blades
$9.10 ...	with carbide-tipped blades
$1.60 ...	for rubber bumper shown below

ORDER AS MANY AS YOU NEED
MONEY-BACK GUARANTEE

Indicate choice of high-speed steel or carboloy-tipped blades, and 18", 20", or 22" lengths. We suggest you include rubber bumpers in your order. Write today!

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BROS. MFG. CO.
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ILLINOIS

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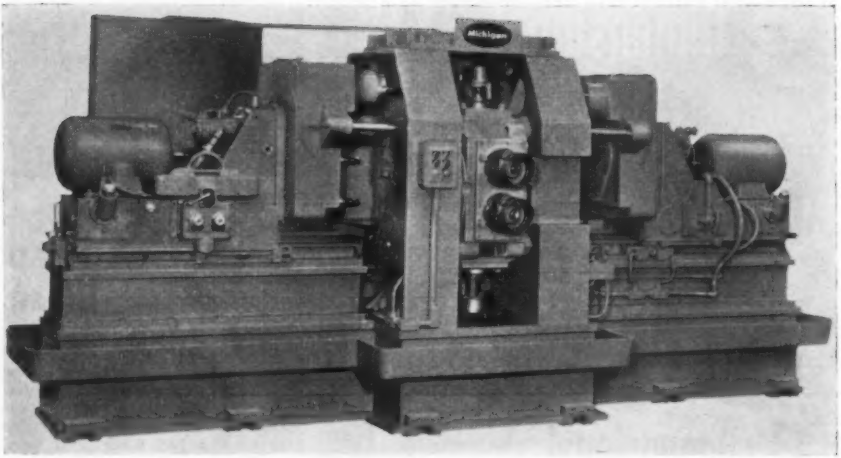
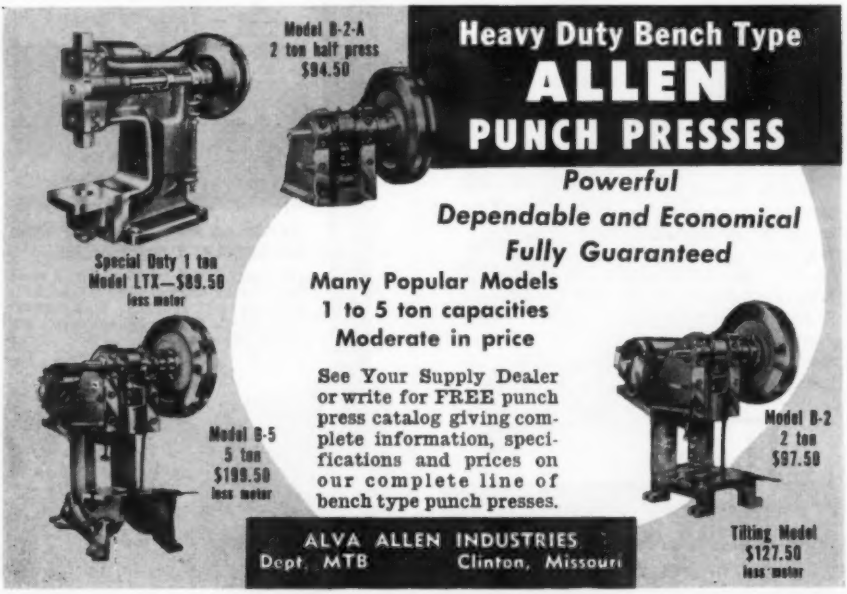


Special Machine Handles 420 Housings Per Hour

This double-end, 4-station, trunnion-type machine was built to rough bore and semi-finish bore compressor housings for a manufacturer of air condi-



Circle No. 410 on Card, Opposite Page 65

tioning and refrigeration components.

Mounted on each of two standard HC-10 units, are the 4-spindle, heavy duty boring heads. The way-type feed units are self-contained. Parts are power clamped. The automatic index table is hydraulically operated. Machine is built to J.I.C. electrical and hydraulic standards. Lubrication is automatic.

Using carbide tools and feeding at the rate of 11" per minute, this machine will handle 420 housings per hour. Two housings are loaded per station to maintain this production rate. Michigan Drill Head Co., Dept. JS, P.O. Box 4643, Detroit 34, Mich.

Use ACTION Card opposite page 64. Encircle No. 30

Epoxy resins enable tool surfaces to withstand wear

Die laminating resin 602, die surface casting resin No. 612-B and die surface coat resin No. 613 offer high abrasion resistance. The 602 epoxy is for applications where extreme wear is anticipated, as in producing draw dies and other metal-forming tools, routing fixtures, and foundry dies.

These materials permit the fabrication of tools and dies without application of heat, since they set at room temperature with the aid of an accelerator. Resin 602, which can be stored unrefrigerated, combines with hardener 680 to provide a mixture of very low viscosity. It wets fibrous glass instantly to create a bond that will not delaminate.

The heavy consistency of coating resin 613 makes it spread evenly when brushed onto a mold. It will not run off vertical surfaces. This resin and casting resin No. 612-B both show a Rockwell M hardness of 98. Marblette Corp., Dept. MG, 37-21 Thirtieth St., Long Island City 1, N.Y.

Use ACTION Card opposite page 64. Encircle No. 31

Beverly THROATLESS SHEAR

Cut any Shape... STRAIGHT OR IRREGULAR

S-3 with Ball Bearing Hold Down

Make any cut — curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All shears equipped with H.C. H.C. Blades for cutting Stainless.

INSIDE SLOTTER

8" Reach — 16 ga. cap.

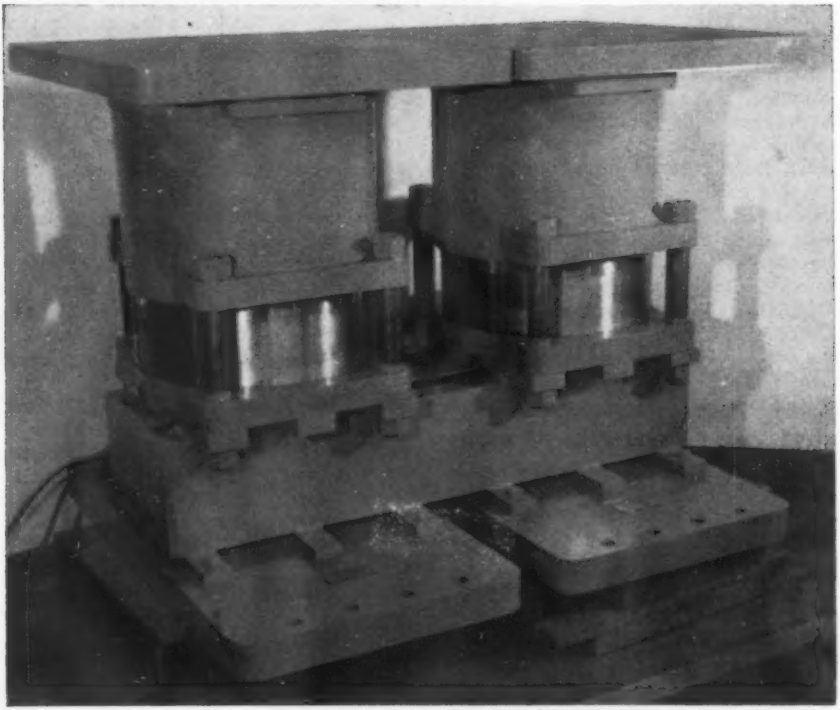
Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x⅛" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for illustrated catalog.

BEVERLY SHEAR MFG. CO., 3005 W. 111th St., Chicago 43, Ill.

Circle No. 411 on Card, Opposite Page 65

Heavy Duty Die Cushion



A new type of pneumatic die cushion installation provides independent individual pressure pad control.

Die cushion is of all-steel construction, with bronze overlay on pistons. The individual pin pressure pads or wear plates are hardened and ground. The cylinder and piston sections have maximum overlap, compensating for off-center loading of the pin pressure pads. Dayton Rogers Mfg. Co., Dept. RB, Minneapolis, Minn.

Use ACTION Card opposite page 64. Encircle No. 32

Injection Molding Machine

A 24-ounce horizontal plastics injection molding machine gives fast cycles and high plasticizing rates. It incorporates a straight hydraulic mold clamp with an adjustable clamping stroke. The new heating cylinder design features an internally heated torpedo with four zone heat control for better plasticizing at lower temperatures. The injection plunger is prepositioned so that the mold is filled immediately after dies are clamped. Both the pressure and speed of the injection stroke is adjustable in stepless variation. A stuffing arrangement increases the maximum shot capacity by approximately 40%.

The improved base design affords greater accessibility to pumping unit and piping. The Oilgear pumping system

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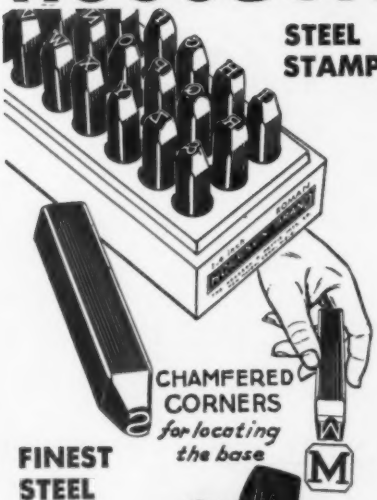
QUALITY
Remember
the Name

HOGGSON

STEEL
STAMPS



CHAMFERED
CORNERS
for locating
the base

FINEST STEEL

long life

ALSO IN
REVERSE
FOR
MOLDS
& DIES

Letters and figures, deep-cut in hardened, special-formula steel, assure clean impressions and long service. Wide range of letter sizes. At your Mill Supply or write for circulars.

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Circle No. 412 on Card, Opposite Page 65

For Arbor Spacers and Shims,
Feeler Stock or Shim Stock...

specify top-quality

DE-STA-CO

ARBOR SPACERS AND SHIMS
20 arbor sizes ⅜" to 4" . . . 19 thicknesses .001" to .125"
Specify with or without keyways. Also available—hardened and ground spacing collars (with standard keyway) ½" to 3" long in all popular sizes. (For use in milling, slitting and gang-saw setups, shimming gears and bearings.)

FEELER STOCK

Made from tempered stock, rolled to close tolerances. ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK
Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in assortment package of 12 thicknesses .001" to .015".

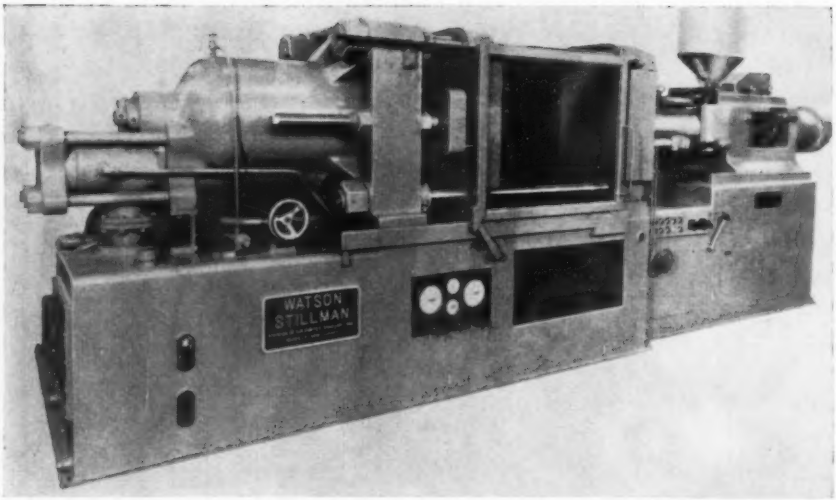
For details and prices,
write for descriptive literature.

DE-STA-CO

Detroit Stamping Co.

347 MIDLAND AVE. • DETROIT 3, MICH.

Circle No. 413 on Card, Opposite Page 65



consists of a radial piston type pump connected to a 60 hp 1200 rpm motor. The pump has an unloading control that reduces the pump stroke and functions to maintain the preset pressure continuously with automatic follow-up without excessive heating or power loss. A new prefill system designed with a shock piston for decompression relieves shock at the prefill valve. Watson-Stillman Press Div., Farrel-Birmingham Co., Inc., Dept. RS, Roselle, N.J.

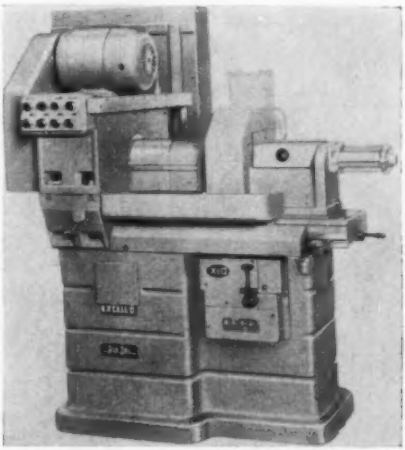
Use ACTION Card opposite page 64. Encircle No. 33

Deep hole drilling

Ex-Cell-O Corp., Dept. JS, 1200 Oakman Blvd., Detroit, has a method of drilling deep holes accurately, from the solid. Known as Bor-Dril, precision limits are held for straightness, roundness, finish and diameter. Cored holes in castings can be finish-machined in one operation.

The part to be Bor-Drilled is clamped to a simple fixture and held stationary, which means that the parts may be of any shape or size. Coolant is supplied under high pressure through the gun type drill. The coolant washes the chips out through the single flute in addition to dissipating heat.

Ex-Cell-O precision boring machines, way-type precision boring machines,



and special machines are suitable for Bor-Drilling.

Use ACTION Card opposite page 64. Encircle No. 34

Extra Capacity with

hall COLLET CHUCKS

for SPEED, ACCURACY, ECONOMY

Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size. Without adjustments. Shortest overhang. All grip ...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Three Sizes to Fit Your Requirements:

Model A...1" (max. capacity 1-1/16")
Model B...2" (max. capacity 2-1/16")
Model C...3" (max. capacity 3¼")

Write today for illustrated catalog and price list—Dept. A-5

HALL MANUFACTURING COMPANY
622 TULAROSA DRIVE, LOS ANGELES 26, CALIFORNIA

Circle No. 414 on Card, Opposite Page 65

BOYAR-SCHULTZ

Precision-made

ALLOY STEEL

T-SLOT BOLTS

For MAXIMUM EFFICIENCY and PROLONGED MACHINE LIFE

ACCURACY of costly machine tools may be ruined using ordinary bolts of soft steel. It is low cost insurance to use Boyar-Schultz precision made T-Slot bolts. Made from heat treated, Alloy steel, heads machined at right angle to shank, to present a broad, flat surface to upper surface of T-slots. Class 3 threads do not strip or distort. For best results use Boyar-Schultz Special Nuts and Washers.

BOYAR-SCHULTZ CORPORATION
2008 S. 25th Ave., Dept. F-B, Broadview, Ill.

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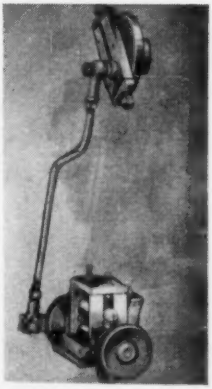
economically priced
press room equipment

DURANT
Roll Feeds

Sixteen standard models that take stock from 2" to 12" wide. Insures accurate feeding—reversible—easy to install. Select - O - Matic indexes available on 11 models.

Manufacturers of Stock Reels, Roll Feeds, Straighteners, Scrap Choppers, Die Pullers, Foot Presses, Coil Cradles, Press Guards, Stock Oilers.



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USE IT EITHER WAY

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features—yet sells for so little. $89.95
complete with cord, plug, switch ready to use

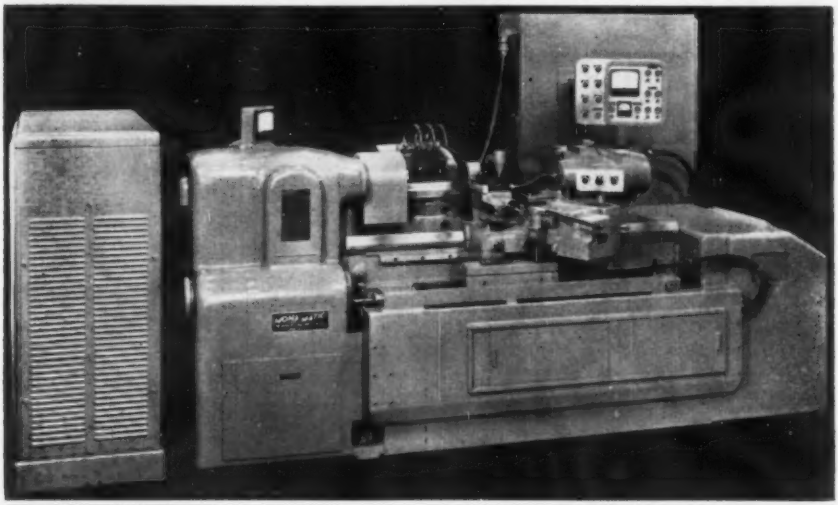
Illustrated Literature on Request
A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

Circle No. 417 on Card, Opposite Page 65

Constant Surface Cutting Speed Offered on Lathe

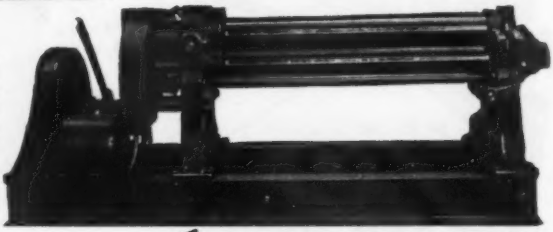
A constant surface cutting speed mechanism for the Model 21 Mona-Matic manufacturing lathe is now offered by The Monarch Machine Tool



Beloit

INITIAL TYPE
BENDING ROLLS

Sheets and plates are quickly formed into cylindrical shapes with this efficient, hard working Beloit Bending Roll. Built for years of trouble-free service. Easy to operate. Rolls are of slip type. Hinged housings permit speedy removal of completed cylinders. Reversing lever places machine in readiness for the next job. Do forming quicker easier and at lower cost with Beloit equipment.



Picture shows a member of the famous Beloit line which also includes Punches, Shears Rod Cutters, Notchers, Bending and Straightening Rolls.

Beloit equipment will cost you less and serve you better.

Write for complete details

HENDLEY & WHITTEMORE CO.
100 Blackhawk Blvd. Beloit, Wis.

Circle No. 418 on Card, Opposite Page 65

Co., Dept. RH, Sidney, O.

Functioning in conjunction with the multicycle programer controlled four cut fully automatic work cycle of the Model 21, this unit provides automatic variation of drive motor speed to maintain the desired surface cutting speed on each of the various diameters and contours of each workpiece in the run.

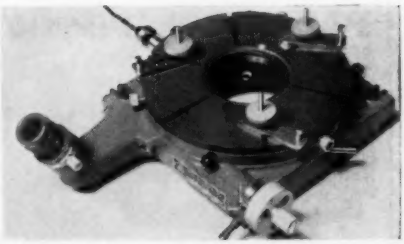
When contours are turned under control of the "air gage tracer" unit of the Model 21, the constant surface cutting speed mechanism continually varies the drive motor speed to automatically maintain the required surface speed at the point the tool tip is actually cutting.

The electrical control equipment of the mechanism is housed in a separate cabinet enclosure positioned near the drive motor end of the machine.

Use ACTION Card opposite page 64. Encircle No. 35

Small optical rotary table

A Leitz precision optical rotary table, having a capacity of 8", is suitable for use in small precision machine tools,



co-ordinate measuring instruments, and for difficult inspection setups on surface plates, where accurate rotation in a horizontal plane must be combined with other measurements.

The master is a 360° glass circle, set to and read through an optical vernier, which is superimposed and adjustable for zeroing. The vernier scale reads in one minute of arc, with a possibility of estimating 30 seconds of arc. George Scherr Optical Tools, Inc., Dept. MG, 200 Lafayette St., New York 12, N.Y.

Use ACTION Card opposite page 64. Encircle No. 36

Executive head of large plastics firm

"My firm saves $27,000 annually with specially designed ESSEX carbide burrs."

"Before we switched to ESSEX tools, we spent $45,000 yearly for high speed burrs. ESSEX carbide burrs, made to our specific needs, cost us only $18,000 — an annual saving of $27,000!"

Find out how ESSEX carbide tools can help *you*. Write for *free*, 12-page illustrated catalog today.

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295 Madison Ave., N.Y.C. 17, MTBB-56
My name .....
Company .....
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City ..... **Zone** ..... **State** .....

Circle No. 419 on Card, Opposite Page 65

do you have a

TOOL PROBLEM

Columbus Die-Tool has been solving tooling problems for over 45 years. Expert designers and builders of all types of tools and special machinery. Write us today!

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and Machine Co.
P. O. BOX 750 • COLUMBUS, OHIO

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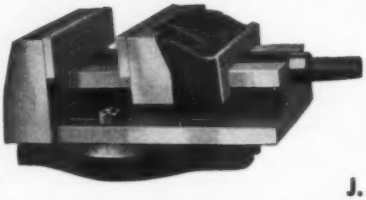
PLUNKET IMPROVED VISES



We make a complete line of modern vises for drill presses, shapers, milling machines and grinders. Illustration shows our standard milling machine vise as regularly furnished and stocked.

In ordering this vise give size of slot in table:
No. 10—6" jaws, 1½" deep, opens 5"
wt. 45 lbs. ..... $ 90.00
No. 20—10" jaws, 2¼" deep, opens 8½"
wt. 120 lbs. $122.00

Best material and workmanship. Prices are net f. o. b. Chicago *Dealers' inquiries are solicited.*

Write for folder TODAY

J. E. Plunket Machine Co. 3230-32 Archer Ave. Chicago 8, Ill.

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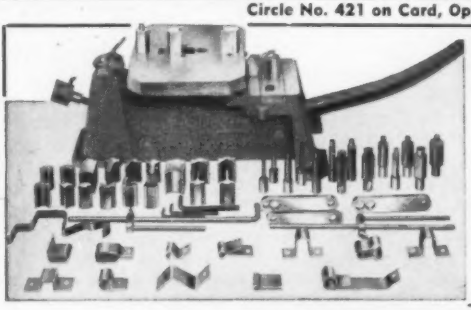

Multiform BENDER CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅜"x1½" as illustrated, other models up to ¼"x4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

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SPACE SAVERS

RACKS FOR ALL BAR STOCKS

Keep your bar stock within easy reach and conserve 75% of your storage space. Eliminate handling accidents. YOHE racks placed back to back increase storage efficiency. Stock always visible. Write for literature and prices today. . . .

THE YOHE SUPPLY CO.
P.O. Box 708 **Canton 1, Ohio**

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OPEN — CLOSED

Plain Type

TRADE AUTOM MARK

Offset Type

CLOSED — OPEN

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET

AUTO MOULDING & MFG. CO.
1110 E. 87TH ST.
CHICAGO 19, ILL.

SPECIFICATIONS
Open width ⅞" to 6"
Gage Material .040 to .125
Pin Diameter .101 to ⅜
Lengths to 120"

SEMI-OFFSET

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STUDY.... these outstanding features of the New CHESTERMAN Vernier Height Gage

The Most significant advance in a quarter Century of HEIGHT GAGE DESIGN

EASY READING 2-1/2" LONG VERNIER
RAPID QUICK ADJUSTMENT
TOP VIEW
TRIANGULAR SCALE BEAM for Superior Strength and Rigidity, preventing sway and vibration.
FINE ADJUSTMENT THRU SCREW ON BASE
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COMPLETE LINE OF PRECISION INSTRUMENTS
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Hammond WET or DRY

CARBIDE TOOL GRINDERS

HAMMOND Carbide Tool Grinders will soon pay for themselves through greater wheel economy, longer tool life and faster grinding.

AMERICA'S MOST COMPLETE LINE.

6", 10", 14" Wet or Dry — Chip Breaker Grinders — Diamond and Abrasive Belt Finishers.

Model WD-10 Wet or Dry 10" Carbide Tool Grinder.

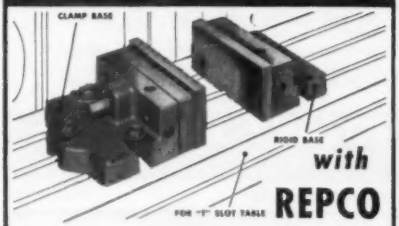
WRITE FOR CATALOG

Hammond Machinery Builders

1614 Douglas Avenue • Kalamazoo, Michigan

Circle No. 427 on Card, Opposite Page 65

INCREASE AVAILABLE CLAMPING CAPACITY



with REPCO

2-Piece Machine Vise Set

Cuts costs . . . supplements use of one-piece vises. Machined for precision accuracy.

- Two Sizes — 6" and 8" widths. Depth 2½". T-Slot center distances: 2¼" - 2¾", 2¾" - 3¾".
- Greater Versatility — useable as general purpose vise, as an angle block, as separate clamping device.

Write for Bulletin 100 - Dealer Inquiries Invited

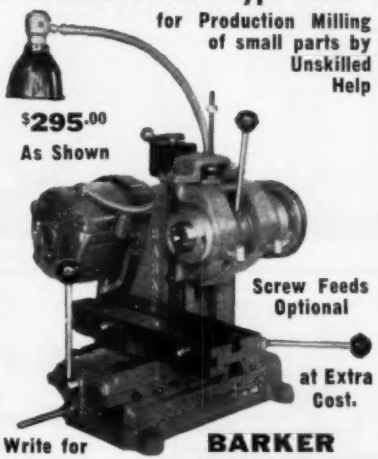
ROCKFORD ENGINEERED PRODUCTS CO.
2324 23rd Avenue • Rockford, Illinois

Circle No. 426 on Card, Opposite Page 65

BARKER Bench Type Mill

for Production Milling of small parts by Unskilled Help

$295.00 As Shown



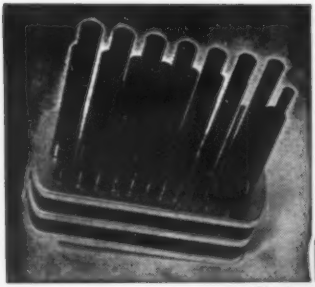
Screw Feeds Optional at Extra Cost.

Write for Details

BARKER ENGINEERING COMPANY

500 GREEN RD., CLEVELAND 21, OHIO

Circle No. 428 on Card, Opposite Page 65



SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

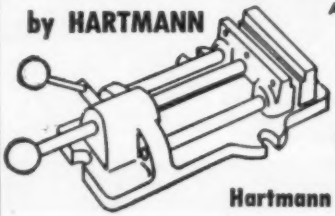
SET #3-17; 28 punches with indexed stand—sizes 3/32" to ½", by 1/64"—plus handy 17/64" size. Length 4⅞". ONLY $16.80.
Single sizes available

R. L. SPELLMAN CO. — URBANA, OHIO

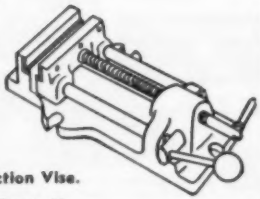
Circle No. 429 on Card, Opposite Page 65

INSTANT ACTION RAPIDSET

by HARTMANN



All Purpose Tool Room and Machine Shop Vises.



The

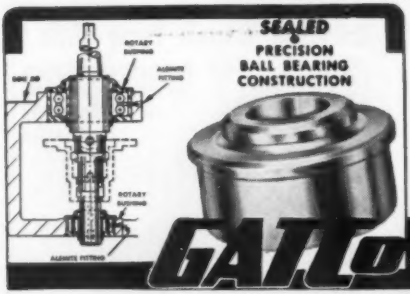
JAWSET

Adjustable Pressure Production Vise.

For Information Write Dept. M

Hartmann Mfg. Co., 1637 Goold St., Racine, Wisconsin

Circle No. 430 on Card, Opposite Page 65



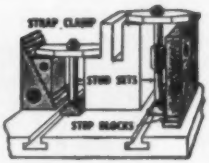
ROTARY BUSHINGS

FOR DRILLING, CORE DRILLING ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting and tool accurately below or above the work—or both.
Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.
Write for full information and prices

ROTARY BUSHINGS
42338 ANN ARBOR ROAD, U.S. 12, PLYMOUTH, MICH.
Telephone PLYMOUTH 1472

Circle No. 431 on Card, Opposite Page 65



SURE GRIP STEP BLOCKS

Clamping tools of all types

Write for free tracing templates

TIETZMANN TOOL CORP.

Dept. C. T. **Englewood, Ohio**

Circle No. 432 on Card, Opposite Page 65

Improved horizontal stock reel

An improved line of horizontal stock reels is available in four sizes, having capacities of 24", 30", 36", 40". All sizes will hold up to a 350 lb. coil.

Reel is easy to load. By turning a handle, the entire guiding mechanism swings so that the coil can be easily placed on the platen. No disassembling of the reel is necessary.

The solid platen can be used as a lubricant reservoir. Durant Tool Supply Co., Dept. JP, 136 S. Water St., Providence, R.I.

Use ACTION Card opposite page 64. Encircle No. 37

Radial drill features flame-hardened column

The Veet radial drill has a flame hardened column; extra large table, 28½" x 48", provided with ¾" tee-slots; radial operation. Column is double constructed to avoid vibration and insure accuracy. The 3-foot arm is raised and lowered by an individual motor with

Cincinnati Centerless Tool

when only a diamond tool will do the job... ASCO has the answer!

The right diamond for the right tool. *Manufacturers:* diamond tools, wheels, compound. *Importers & dealers:* carbons, bortz, ballas. WRITE TODAY FOR FREE CATALOGS & LITERATURE.

ANTON Smit & CO. INC.

Specialists in diamonds and diamond tools since 1908.

111 Eighth Ave., New York 11

Representatives: Territories Open; Inquiries Invited

Circle No. 433 on Card, Opposite Page 65

PORTABLE ELEVATING TABLE

Saves TIME and LABOR

Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height from 31" to 46½", leaving operator's hands free. Table swivels and locks in any position.

Our major services — Designing and Building — Dies, Jigs, Fixtures and Special Machinery.

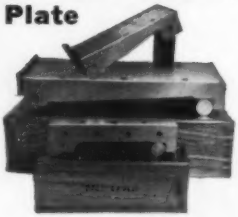
SEND TODAY FOR ILLUSTRATED CATALOG No. 2

THE MIDWEST TOOL & ENG. CO.
112 WEBSTER ST., DAYTON, OHIO

Circle No. 434 on Card, Opposite Page 65

ACCURATE—LOW COST SINE BARS and PLATES

5" Sine Plate only $37.50



- Guaranteed Accuracy
- Precision Ground
- Hardened Rolls
- Double Normalized
- Tapped Holes
- End Plates
- Solid Oak Case Extra
- Immediate Shipment

Sine Plates and Bars

No.	Cent. Dist.	Width	Price	With Oak Case
1605	5"	3"	37.50	43.00
1610	10"	5"	87.50	95.00
1705	5"	1"	21.75	25.25

FOB St. Paul

Accurate to .0002" in center distance and parallelism for the length of the tool. Order today—from your dealer or direct.

Bald Eagle Tool Co.

357 Minnesota St. • St. Paul 1, Minn

Circle No. 435 on Card, Opposite Page 65

ENCO TINY TITAN TRADE MARK

SAVE SET-UP TIME WITH

MODEL NO. 100 MAGNETIC BASE DIAL INDICATOR HOLDER

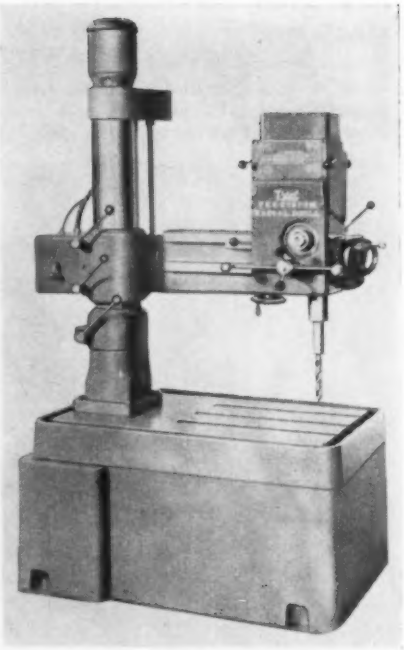
Send For Latest Bulletin

- Magnetic Pull 65 lbs.
- Includes swivel adaptor permitting 360° adjustment in all directions.

Model 100 Being used to align Fixture in Production Mill

ENCO Manufacturing Co., Dept. 256
4524 W. Fullerton Ave., Chicago 39, Ill.

Circle No. 436 on Card, Opposite Page 65



finger-tip control. Work weighing up to 5 tons can be handled.

Any of the 16 gear speeds—50 to 1400 rpm—can be selected at will with the hand levers. Four power feeds, lever controlled, provide the right feed for the speed and size of drill. Veet Industries, Dept. JS, 25753 Groesbeck Highway, East Detroit, Mich.

Use ACTION Card opposite page 64. Encircle No. 38

Installment sales program

The Wales-Strippit Corp., Dept. RH, 345 Payne Ave., North Tonawanda, N.Y., has introduced a "pay-as-you-produce" plan to finance sales of its sheet metal fabricator and major accessories. The plan permits a modest initial investment, with payments distributed over from three to ten years. The amount of monthly payments will decrease each year during the term.

Use ACTION Card opposite page 64. Encircle No. 54

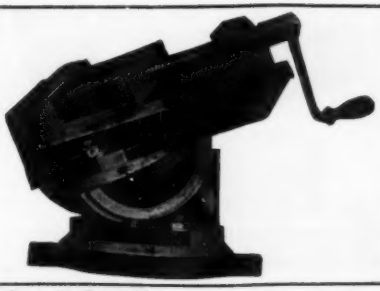
SET UP COMPOUND ANGLES INSTANTLY!

Now save valuable time on intricate, angular set-ups with the fully universal MASTER MULTI-SWIVEL VISE. Three swivels instantly set any compound angle. Used worldwide. Interchangeable platens optional.

Write for circular.

DONOVAN MFG. CO.

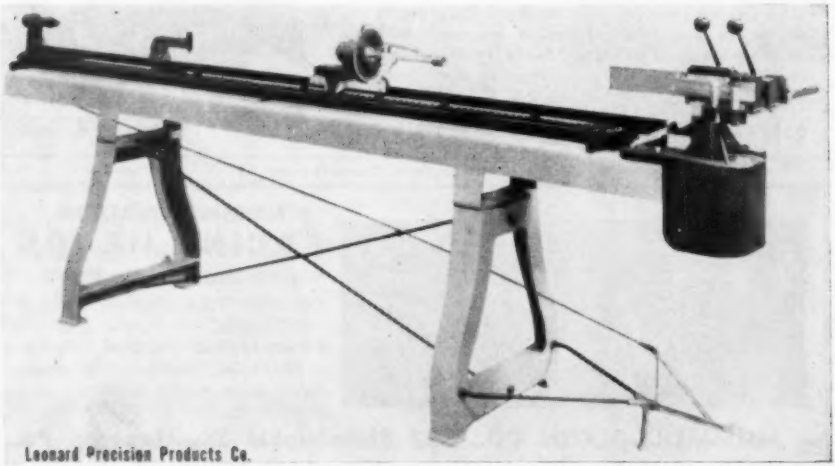
80 Batterymarch St. Boston 10, Mass.



Circle No. 437 on Card, Opposite Page 65

Tube Bending Machine

The Leonard-Douglas Bendmaster, for extended runs where more than one bend per tube is required, has a self-indexing system which pre-sets



Leonard Precision Products Co.

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY

2301G North 11th St. • St. Louis 6, Mo.

Circle No. 438 on Card, Opposite Page 65

Our Large, planned stocks of **Punches & Dies**

mean savings for you.

For years we have been following a systematic plan of increasing our stocks of standard punches and dies that benefits you two ways:
(1) The punches and dies you need are READY and waiting WHEN YOU NEED THEM.
(2) Because standards are made in large quantities, PRICES ARE SURPRISINGLY LOW—quality of the highest.

68 years of experience goes into every Lewthwaite tool—and it shows!

CATALOG SHEETS ON REQUEST.

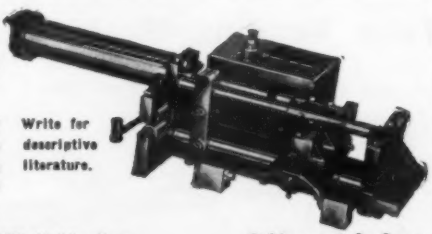
T. H. LEWTHWAITE MACHINE CO. 312 East 47th St., New York 17, N.Y.

Circle No. 439 on Card, Opposite Page 65

COOPER WEYMOUTH
OPEN THROAT
AIR OPERATED SLIDE FEED
For Power Press Operation

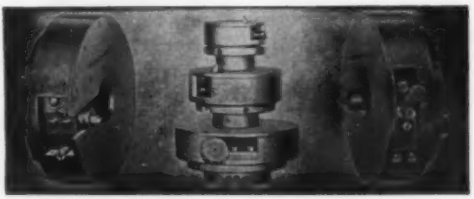
Operates on standard shop air lines. Easy to set up and adjust, holds to extreme accuracy. Made in five sizes. Feeds lengths to 36", up to 18" wide on mechanical and hydraulic presses.

Write for descriptive literature.



COOPER WEYMOUTH, INC. 277 Noble Ave. **Bridgeport 8, Conn.**

Circle No. 440 on Card, Opposite Page 65



MUMMERT-DIXON
FACING HEADS
with Automatic Feed

One-way Tool Feed—6, 9 and 12" sizes.
Two-way Tool Feed—9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.
Save many costly set-ups.
Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

Circle No. 441 on Card, Opposite Page 65

PALMGREN
for MILLING MACHINES, DRILL PRESSES, GRINDERS, SHAPERS...

64 different models and types of vises, rotary tables, milling attachments, and other machine tool accessories.

Write for catalog No. 203

ANGLE VISES
6 JAW SIZES

SIZES
1½"
2½"
3"
4"
5"
6"

All with SWIVEL BASE

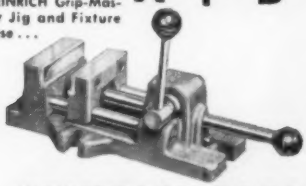
MILLING MACHINE VISES
No. 40B and 60B
4" and 6" Jaws with or without SWIVEL BASE

CHICAGO TOOL AND ENGINEERING CO., 8384 South Chicago Avenue, Chicago 17, Illinois

Circle No. 442 on Card, Opposite Page 65

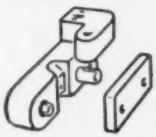
A Simple Formula for Solving Tooling Problems

No need to start from scratch . . . use the HEINRICH Grip-Master Jig and Fixture base . . .



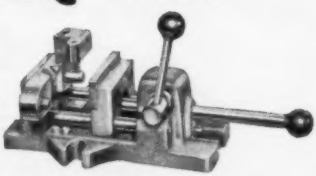
A + B

Simply add false jaws and bushing plate.



= C

Result . . . an accurate, low-cost Drill Jig.



HEINRICH TOOLS, Inc. Dept. 106-E Racine, Wis.

Circle No. 443 on Card, Opposite Page 65

machine for entire sequence of bends. Tubing remains in machine throughout bending process.

Automatic stops control tube rotation, angle, degree and spacing of bends, providing uniformity of finished pieces. Tubing from ¼" to 1" o.d. is accommodated by this manually operated, floor model machine. Leonard Precision Products Co., Dept. KE, 9200 Bolsa Ave., Santa Ana, Calif.

Use ACTION Card opposite page 64. Encircle No. 39

Gold plater

The Ramyr gold plater is a self-contained unit including dc power supply and double wall stainless steel tank. Stepless voltage control, large meters and timer insure accurate plating. The tank is heated with sealed contact heaters that are thermostatically controlled.

A cathode rod agitator is incorporated for uniform heavy deposits on industrial parts. Manufactured by Ramyr Mfg. Co., Dept. KE, 1624 East 1st St., Los Angeles 33, Calif.

Use ACTION Card opposite page 64. Encircle No. 40

Small Saw – and BIG Features

MODEL A—Capacity 6"x11" with BIG machine features. Rugged construction. Precision saw guides. Adjustable cutting pressure and rate of descent. Quick action swivel vise. ½" blade. Rotary blade brush. Automatic blade shut-off. 1/3 H.P. motor with overload protection. Table available to use saw vertically for contouring, notching, and slotting!

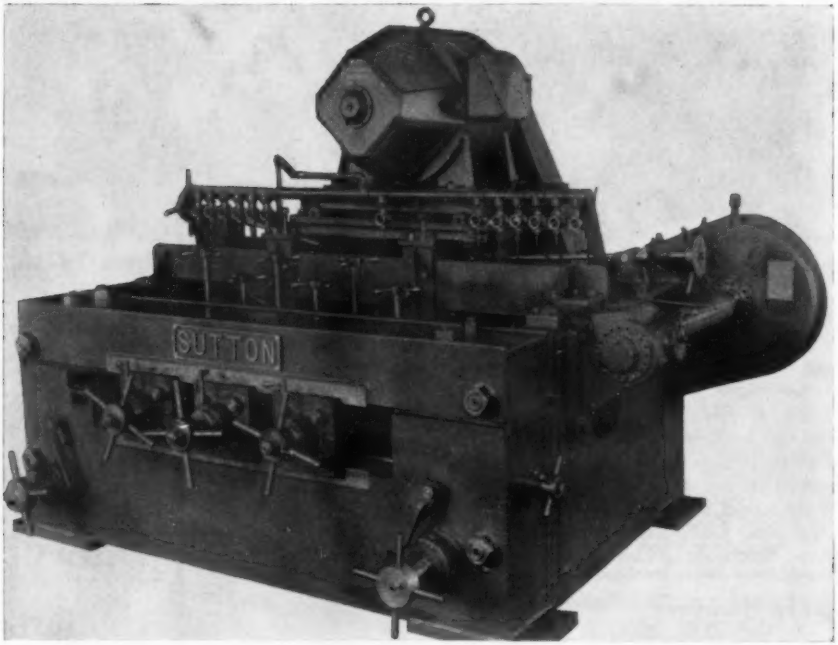
Send for FREE CATALOG Dept. B

W. F. Wells and Sons
Metal Cutting Band Saws
THREE RIVERS, MICHIGAN

MODEL A

Circle No. 444 on Card, Opposite Page 65

Bar Straightener has Polishing Action



The Sutton Model 2FX high-speed straightening and polishing machine is designed to polish as it straightens cold drawn bars of from ¾" to 4½" in diameter. With a rated production speed of 300 feet per minute, it can be installed directly in a fast mill line. Entry and delivery tables can be added for automatic handling of the drawn and sheared bars.

The pass line is horizontal with two large rolls opposed by three smaller rolls. Four of the five rolls are driven to provide the correct amount of burnishing action required to give the bars a bright, smooth finish as they are being straightened. Concentricity is controlled by the machine and size tolerance can be controlled by raising or lowering the diameter of the bar, depending on the analysis of the grade being straightened. Sutton Eng. Co., Dept. RH, First National Bank Bldg., Pittsburgh 22, Pa.

Use ACTION Card opposite page 64. Encircle No. 41

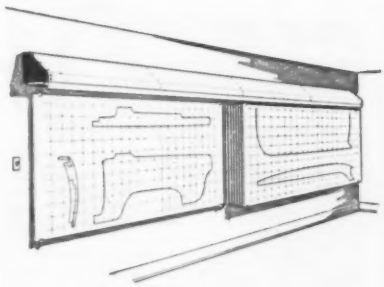
Plain ring gage sets

Boremaster plain rings, used for setting dial bore gages, i.d. micrometers, etc., may now be obtained in sets. Rings are accurate to .0001 or less for roundness, straightness and taper with tolerance of ±.0002" from basic size. Rings are made from standard A G D blanks with the i.d. honed to 4-6 microinches, rms. Actual size is stamped to four decimal places on each ring.

Standard cabinet set B-1 includes rings in steps of 1/64", range .500" to 1.000" inclusive. Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill.

Use ACTION Card opposite page 64. Encircle No. 42

New! SIMPLE AND EASY METHOD OF FILING LARGE LAYOUTS!



Standard racks come in various sizes and have 8 tracks. Can be built to accommodate any specified number of tracks. Designed to meet your individual requirements.

ROLL-A-WAY FILING SYSTEM

A simple, practical and inexpensive method of filing large layouts, master drawings, progress charts, templates and factory records so as to make them readily accessible.

Consists of a rack with parallel tracks from which the layouts are suspended by means of roll hangers. Any desired layout can be quickly rolled from its filing place out into full view.

Write for Literature

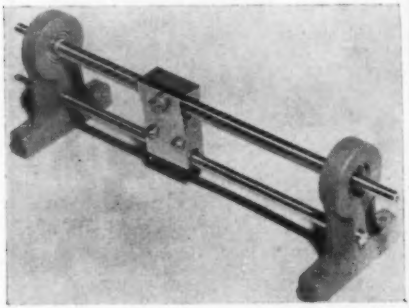
INTER-LAKES ENGINEERING CO.

4845 Bellevue **Detroit 7, Mich.**

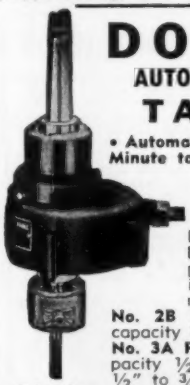
Circle No. 445 on Card, Opposite Page 65

Precision lead screw assembly

This precision lead screw assembly converts rotational motion into linear motion of a carriage; unit can mount a pen or indicator for display or recording purposes. Available in two pitches giving .050 in. movement per revolution or .0356 in. per rev. Pic Design Corp., Dept. MG, 160 Atlantic Ave., Lynbrook, L. I., N. Y.



Use ACTION Card opposite page 64. Encircle No. 43



DORMAN AUTOMATIC REVERSE TAPPERS

- **Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.**
- **WIDE RANGE TAP CAPACITY.**

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/8" in Steel—1/2" in Aluminum.

No. 2B POSITIVE TAPPER — capacity 3/8" to 7/8" in Steel.

No. 3A POSITIVE TAPPER—capacity 1/2" to 1 1/4" in Steel—1/2" to 3/4" Pipe Taps.

No. 4A TAPPER—capacity 3/4" to 2" in Steel including Pipe Taps.

- **PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.**

Priced from $50.00
Write for Bulletin
IMMEDIATE DELIVERY

THRIFTMASTER PRODUCTS CORPORATION
Division of Thomson Industries, Inc.
1030 N. PLUM STREET, LANCASTER, PA.
STANDARD UNIVERSAL, ADJUSTABLE AND SPECIAL TAPPING CENTER DR...

Circle No. 446 on Card, Opposite Page 65

CHECK *Abart* FOR ALL SPEED REDUCTION NEEDS!

Compact, Efficient, Long-Life Units . . . more than 75 models available. Ratings from 1/50 to 168 hp., ratios to 10,000 to 1.

Write for pocket-size Abart Catalog

ABART GEAR and MACHINE CO.

4829 WEST 16th STREET • CHICAGO 50, ILLINOIS

Circle No. 447 on Card, Opposite Page 65

KEO

KEYSEAT CUTTERS

High speed. Right hand ½" shank. Diameter from ¼" to 1½". Standard sizes in stock for immediate delivery. Complete set —41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.

WRITE—WIRE—PHONE

Jobbers' Inquiries Invited

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

Circle No. 449 on Card, Opposite Page 65

UNIVERSAL DIVIDING HEADS

Precision built to meet every requirement, Carroll Dividing Heads are the accepted standard in metal-working plants from coast to coast.

A unique optional swivel base makes possible speedy and accurate work settings to compound angles. This and other features convert a conventional Dividing Head into a Universal Work Head or Rotary Table.

Write for 8 page catalog giving complete details, etc.

10" - 12" Universal Right or Left Hand Dividing Heads with or without Direct Indexing.

CARROLL DIVIDING HEAD CO.

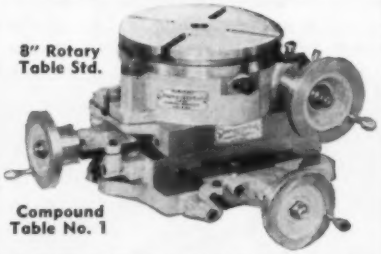
3525 Cardiff Ave. • Cincinnati 9, Ohio

Circle No. 448 on Card, Opposite Page 65

The *STEVENS* Line

SINCE 1925

Introducing NEW series



8" Rotary Table Std.

Compound Table No. 1

ROTARY TABLES, 5-7½-8-12-15-18-24" sizes both standard & dial indexing types
ADJUSTABLE TILTING TABLES, #0 - - 2
COMPONUD TABLES, #1 - 2
ROTARY-COMPOUND TABLES, #1 - 1½ - 2
INDEX CENTERS - multiple spindle
ROTARY-COMPOUND TABLES, #1 - 1½ - 2

See your dealer or write for bulletins

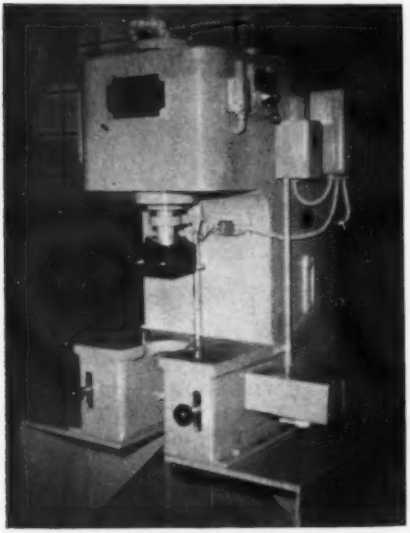
The JOHN B. STEVENS Company

SOMERSVILLE, CONN.

Circle No. 450 on Card, Opposite Page 65

Hydraulic bench press line

Acme bench or pedestal-mounted hydraulic presses, equipped with rotary index work tables ranging in size from 14" to 60" dia., can be automated. They are adaptable to such operations as staking, assembling, swaging, broaching, forcing, crimping, punching, forming, bending, trimming.



Manual controls may be single- or dual-lever or foot pedal. Fast and smooth in operation, presses withstand extreme pressures with virtually no deflection.

Twenty-three models are offered as standard: from 13" daylight and 7" stroke to 24" daylight and 12" stroke. Acme Broach Corp., Dept. JS, Milan, Mich.

Use ACTION Card opposite page 64. Encircle No. 44

Blank feeder orients by Keyway or driving hole

A new type automatic blank feeder and stacking unit orients by keyway or driving hole.

Designed to be used with the V & O Model 410 notching machine, it auto-

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Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

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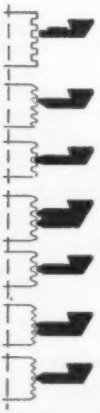
Circle No. 451 on Card, Opposite Page 65

REDUCE THREAD CUTTING COSTS WITH NEW "ST" THREADING TOOLS

Precision ground cutters



Any Standard or Special Thread Form can be cut more precisely and economically with type "ST" Threading Tools.

We supply *long-life super HSS cutter* blades precision ground to any thread form. To resharpen these cutters only grind top face.

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R. B. TOOL CO., Inc.
785 NORTH BROADWAY
WHITE PLAINS, N.Y.

Circle No. 452 on Card, Opposite Page 65

matically transfers rotor or combination rotor and stator blanks from an oriented stack to the notching fixture. It positions the blank on the spindle, removes the notched blank, and stacks it. The feeding and stacking time, exclusive of the notching operation, is approximately 1½ seconds.

The first unit will accommodate blanks 4 to 13 inches in diameter. A second unit handles blanks 10 to 30 inches in diameter.

Blanks without a keyway are oriented by the slot only. Blanks with a keyway or driving hole are oriented by either the keyway or driving hole. V & O Press Co., Div. of Emhart Mfg. Co., Dept. RS, Hudson, N.Y.

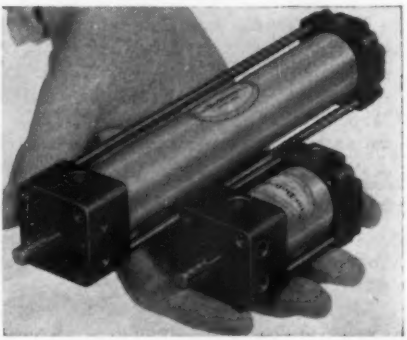
Use ACTION Card opposite page 64. Encircle No. 45

Cylinder line expanded

Han-D-Air double-action small air cylinders with air-powered advance and retract strokes, as well as single action air-powered advance, spring return units, previously available in 1" stroke only, are now offered in 1", 2", 3" and 4" strokes.

They are used for clamping, parts positioning and ejecting, and for light-duty tool and work feeding operations. Cylinders may be front or side mounted, front or rear flange mounted, or front pivot mounted. The 5/16" piston rod is threaded for easy coupling. The Bellows Co., Dept. RH, 222 W. Market St., Akron 9, O.

Use ACTION Card opposite page 64. Encircle No. 46



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SET SCREWS • MILLED STUDS
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*Wm. H. Chandler Co
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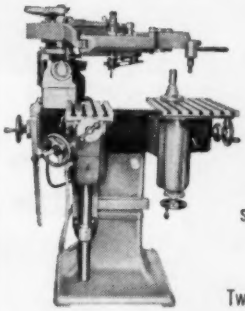
Circle No. 453 on Card, Opposite Page 65

ALEXANDER die sinkers

for 2 or 3 dimensional work



Latest model, No. 3A for molds and dies up to 1000 lbs. Ratios from 1.5:1 to 10:1, 14 spindle speeds from 475 to 9500 rpm, cutters up to 3/8" dia. Two smaller sizes, 1A and 2A.

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on these quality, British machines.

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Circle No. 455 on Card, Opposite Page 65

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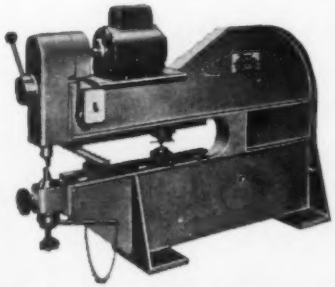

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NUTLEY, NEW JERSEY

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- Saves fixtures and time consuming setups.
- Saves time in circular positioning.

WORM WHEEL OPERATED ROTARY TABLES

Six sizes: 9", 12", 15", 18", 21", 25"

For die sinking, jig boring, cam milling. Indispensable in wood and metal pattern shops.

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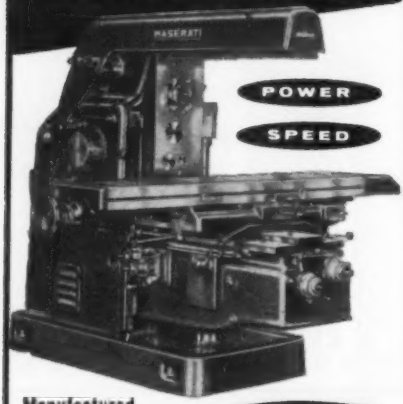
MILLING MACHINES



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Indexing attachment for precision grinding

The Whirl-Dex indexing attachment is a complete tool, consolidating many practices and methods now used for grinding various tools. The body is made of a meehanite casting with an oil hardened tool-steel base and having hardened steel bushings. Face plate is 6½″ in dia. and is bolted to spindle hub which is lapped so as to locate the face plate concentrically to the axis of the spindle.

The back face of the face plate has 24 equally spaced holes on a 6″ circle, giving 15° spacing. A secondary plate which acts as a 3″ sine plate rotating on the axis insures indexing of any angle to an accuracy of approximately .0001″ error in 3″. Without changing face plates, 1,296,000 different angle combinations are possible.

A ground and lapped .7500″ dia. hole through the spindle permits grinding pins, gages, and shafts of any length. The thrust of the spindle is controlled by a thrust washer allowing only .0001 end thrust. The Whirl-Dex Co., Dept. JS, 14847 Heyden, Detroit 23, Mich.

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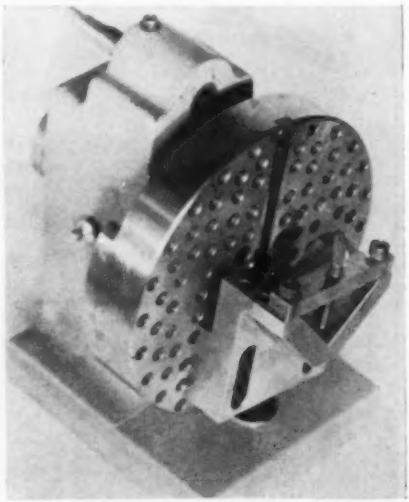

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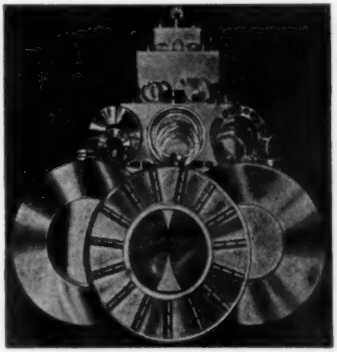

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Way Machine Speeds Refrigerator Parts Production

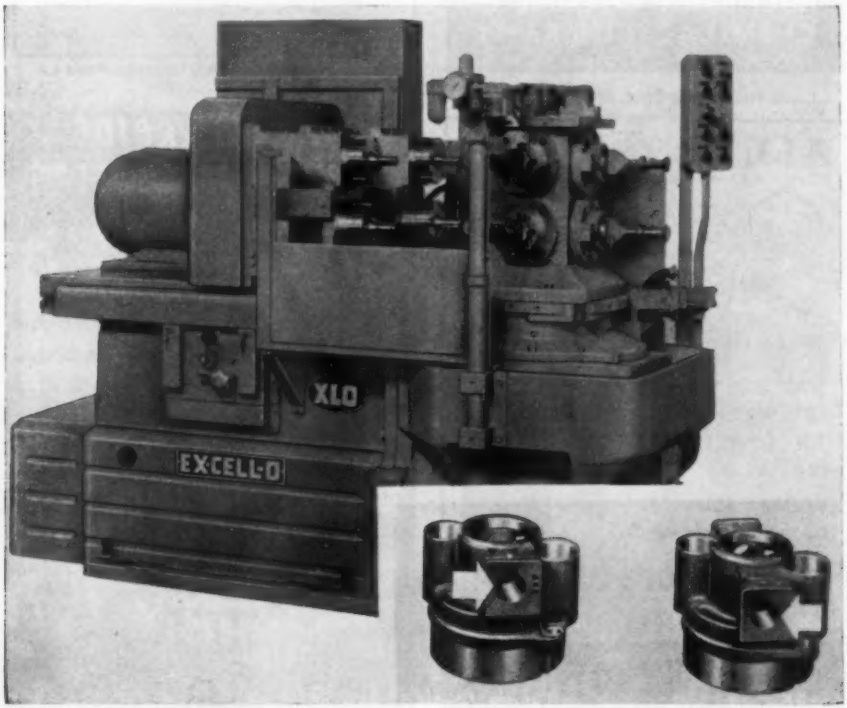
A standard Ex-Cell-O Style 54 one-way machine processes cast iron compressor crankcases for refrigeration equipment.

Using a four-station indexing fixture the machine bores, counterbores and chamfers two offset, opposing cylinders, holding to accurate dimensional limits. Comparable accuracy is also achieved in holding the relative positions of the cylinder bores to the main crankcase bearing.

The two crankcases are loaded one above the other, at each of the four indexing stations. The loading is done at the right of the indexing fixture, while other parts are being machined at the front and rear stations. The parts are air-clamped in position. A mechanical safety device is provided to retain the parts on the fixture, should the air pressure fail.

A motor-driven mechanism turns the fixture and a wedge-type shot bolt positions the fixture radially. During machining operations, the fixture is held down by hydraulic pressure to insure a firm bearing. This pressure automatically releases for indexing movements. Until the bearing is established, a safety switch prevents the tool spindles from approaching the workpiece. Cycles are fully automatic except for loading and unloading. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Use ACTION Card opposite page 64. Encircle No. 48



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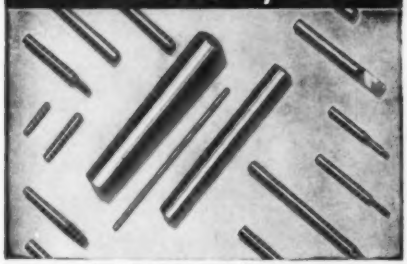

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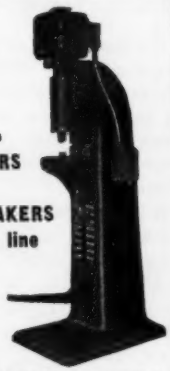

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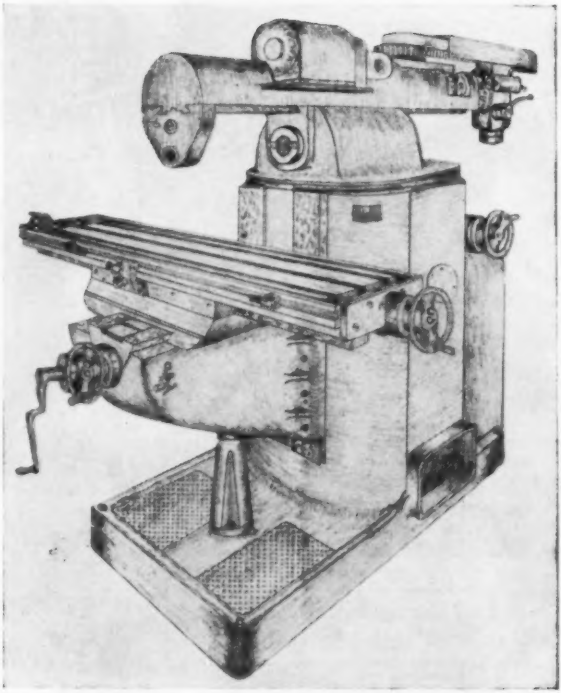

Horizontal, vertical, angular and universal milling operations may be performed on the Quartet, a new No. 2 floor-type milling machine.

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Machine is equipped with a rectangular overarm casting on the rear of which is mounted an independently motor-driven, heavy-duty power feed vertical milling head. To change the machine from horizontal to vertical operation merely requires indexing the turret 180° to bring the vertical head over the table.

For unusually cumbersome or heavy milling work, it is possible to mount the workpiece in a fixture on the floor on either side of the column, and to mill with either the horizontal or vertical spindle, depending on the operation required. It is also possible to operate both the horizontal and the vertical spindle simultaneously, if such operation is advantageous. The horizontal spindle is driven by a 3 hp motor and provides infinitely variable speeds. The vertical head is powered by a 1½ hp drive motor.

A 42" long table provides a 30" longitudinal feed. The horizontal spindle, mounted on a double row of Timken bearings, is driven at slow speeds through a massive 12" gear. At high speeds the gearing is disengaged and the spindle drive is through timing belts. Manufacturer, U. S. Burke Machine Tool Division, Dept. BB, Brotherton Rd., Cincinnati 27, O.

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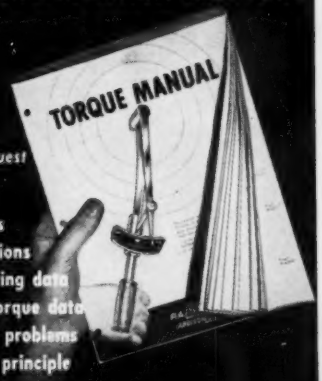

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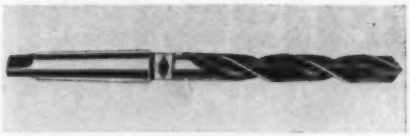

and in fractional, jobber, letter and wire gauge sizes. Whitman & Barnes, Dept. JS, 40600 Plymouth Rd., Plymouth, Mich.

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LASSY TOOL CO. Plainville, Conn.

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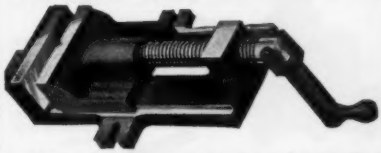

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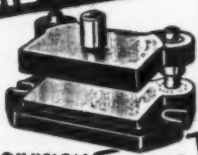

DANNEMAN DIE-SET DIVISION
ACME-DANNEMAN COMPANY, Inc.
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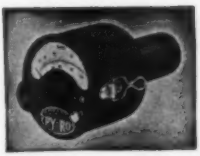

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Tapped, Reamed or Blank

Hex-shaped hub for extra tightening

Write for catalog

TIETZMANN TOOL CORPORATION

DEPT. H-K ENGLEWOOD, OHIO

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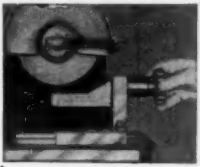

New 1956 Model "SS"

RADIUS DRESSER

Outperforms them all

Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations. Write for free illustrated folder.

At new low price $124.50 with diamond

SOMERSET TOOL CO. 244 Virginia St. Hillside, N. J.

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NEW NESTING TYPE

TOTE PANS

Sturdy 16 ga. metal. 20" long x 12" wide x 6¼" deep. Drag holes and handles at both ends.

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Bridgeport 5, Conn.

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JIG BORING

and

Large Precision Machining

Done to your specifications

WE HAVE 21 JIG BORERS

KIDDE PRECISION TOOL CORP.

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Buy safe "SHUR-GRIP"

drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes remolding easier, quicker, surer, less expensive.

COMPLETE LEAD HAMMER SERVICE

Write for circular and prices

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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MINIATURE

DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32"

O.D. 3/32" to 13/64"

Lengths ¼" to ¾"

.0002 Tolerance on I.D., O.D., and Concentricity

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PREBCO BUSHING CO.

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Baldwin Park, California

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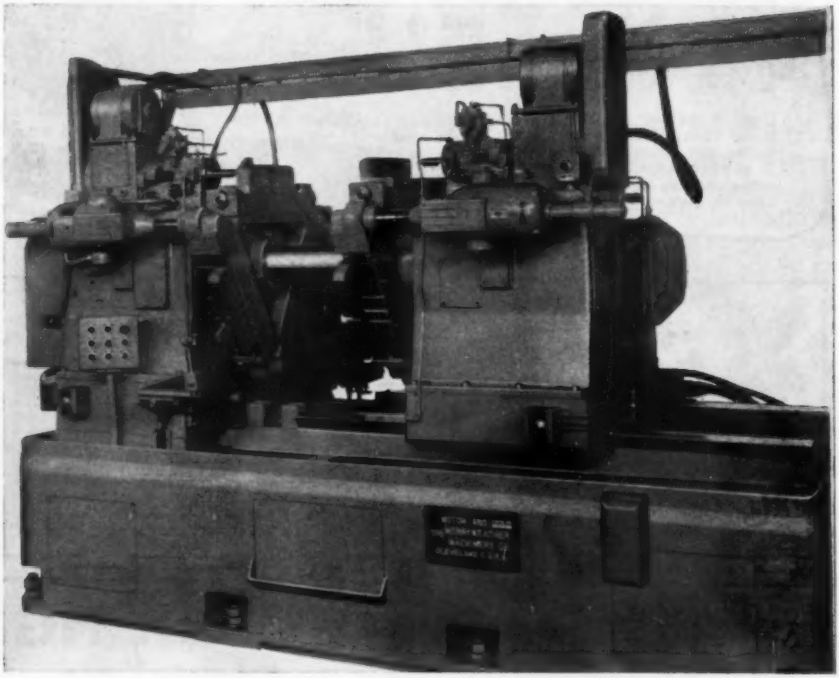
Milling and Centering Machine



The Model 3 MCT milling and centering machine is quickly set up for lengths up to 48" and drills to a depth of 4" if desired. Two triangular fixtures with six trunnion vises index 120 degrees between three stations. Station one is for loading and unloading. At a second station, double-end center drilling takes place. These three operations (load-unload, mill, and center drill) are simultaneous and in the foregoing order. The operator removes a finished part and places a new piece at the open vise while milling at station two and drilling at station three are being done. As an added accessory, automatic loading and unloading can be incorporated in order to automate fully the milling and centering operations.

Milling heads are of single-speed type, and are adaptable for carbide tooling. Speed changes are available with change gears. The quill type spindle has a 2" manual adjustment by graduated dial with a positive manual lock. The feed rate of heads is infinitely variable. The Motch & Merryweather Machinery Co., Machinery Mfg. Div., Dept. RH, 888 E. 70th St., Cleveland 3, O.

Use ACTION Card opposite page 64, Encircle No. 52

Please Mention
MACHINE and TOOL
BLUE BOOK
When Writing Advertisers

SID TOOL COMPANY, INC. | *Your headquarters for Special Taps and Drills now stocks . . .*

HIGH SPEED **SPECIAL SIZE** MILLING CUTTERS

SIDE MILLING CUTTERS

Precision made in U.S.A.

IN STOCK FOR IMMEDIATE DELIVERY!

DIAM-ETER	WIDTH OF FACE	SIZE OF HOLE	PRICE EACH
4	7/32	1	11.40
4	9/32	1	13.35
4	5/16	1	13.70
4	7/16	1	15.05
4	9/16	1	17.15
4	11/16	1	18.10
4	13/16	1	20.85
4	15/16	1	22.95
4	1	1	23.65
4	1 - 1/8	1-1/4	25.75
4	1 - 1/4	1-1/4	28.35
5	1/4	1	17.50
5	5/16	1	17.80
5	3/8	1	19.70
5	7/16	1	20.95
5	9/16	1	23.55
5	11/16	1	26.30
5	13/16	1	28.35
5	7/8	1-1/4	30.50
5	15/16	1	31.50
6	1/4	1	21.60
6	5/16	1	22.10
6	3/8	1	23.70
6	7/16	1	25.30
6	9/16	1	31.20
6	11/16	1-1/4	33.45
6	13/16	1-1/4	35.75
6	7/8	1	36.65
6	15/16	1-1/4	38.50
8	1/4	1	47.70
8	5/16	1	49.70
8	3/8	1	51.05
8	7/16	1	53.70
8	1/2	1	54.55
8	9/16	1-1/4	56.65
8	5/8	1-1/4	57.50
8	11/16	1-1/4	59.35
8	13/16	1-1/4	60.50
8	7/8	1-1/4	62.20
8	15/16	1-1/4	63.85
10	1/4	1-1/2	87.85
10	5/16	1-1/2	88.90
10	3/8	1-1/2	83.75
10	1/2	1-1/2	92.30
10	5/8	1-1/2	105.35
10	3/4	1-1/2	121.50
10	7/8	1-1/2	131.95
10	1	1-1/2	136.70
12	1/2	1-1/2	153.95
12	5/8	1-1/2	169.75
12	3/4	1-1/2	174.35
12	7/8	1-1/2	220.10
12	1	1-1/2	236.60

STAGGERED TOOTH SIDE MILLING CUTTERS

Precision made in U.S.A.

IN STOCK FOR IMMEDIATE DELIVERY!

DIAM-ETER	WIDTH OF FACE	SIZE OF HOLE	PRICE EACH
5	1/4	1-1/4	20.95
5	5/16	1-1/4	21.85
5	3/8	1-1/4	23.20
6	5/16	1-1/4	30.80
6	7/16	1-1/4	31.85
6	9/16	1-1/4	36.70
6	11/16	1-1/4	40.65
6	13/16	1-1/4	42.15
6	15/16	1-1/4	44.55
8	5/16	1-1/4	63.20
8	7/16	1-1/4	66.80
8	9/16	1-1/4	70.55
8	11/16	1-1/2	75.65
8	13/16	1-1/2	79.35
8	7/8	1-1/2	83.25
8	1	1-1/2	87.35
10	1/4	1-1/2	87.80
10	5/16	1-1/2	89.10
10	3/8	1-1/2	90.15
10	7/16	1-1/2	95.70
10	1/2	1-1/2	99.75
10	9/16	1-1/2	110.85
10	5/8	1-1/2	113.10
10	3/4	1-1/2	129.35
10	7/8	1-1/2	133.30
10	1	1-1/2	139.20
12	1/2	1-1/2	166.45
12	5/8	1-1/2	170.95
12	3/4	1-1/2	181.45
12	7/8	1-1/2	221.65
12	1	1-1/2	238.95

DEALER INQUIRIES INVITED

If you are a user of cutting tools it will pay you to be on our mailing list. We also stock special and standard sizes in slitting saws, end mills, etc. Write for circular now to Dept. B.

SID TOOL COMPANY, INC.

Cutting Tool Specialists

158 LAFAYETTE ST., NEW YORK 13, N. Y.

Telephone: BEekman 3-4270

Circle No. 489 on Card, Opposite Page 65

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Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. **Rates: $20 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.**

Copy should reach us by the first of the month for next month's issue.

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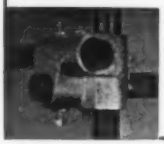

with Amidon Fittings and one inch pipe.

Amidon Engineering Co.
ELYRIA 10, OHIO

Deburring tools for hole faces with irregular surfaces

The Ellipti-Burr tool, for the deburring and chamfering of openly accessible hole faces having irregular surfaces, has been announced by the Nobur Mfg. Co., Dept. KE, North Hollywood, Calif. It is a self-piloting two-lipped cutter which automatically accommodates and follows the hole surface geometry. The pilot is conical and accommodates any hole size within its working range.

The tool enters approximately squarely to the hole, without regard to the true axis of the hole. The pilot seats across the minor diameter and provides the pivotal fulcrum for the cutter blade as it describes its orbit. The cutter blade has two diametrically opposed cutting edges, and is supported so as to permit both radial and axial displacement.

Model EL5 is intended for general applications on holes from 5/32" to 5/16" diameters. Nobur Mfg. Co., Dept. KE, 6860 Farmdale Ave., North Hollywood, Calif.

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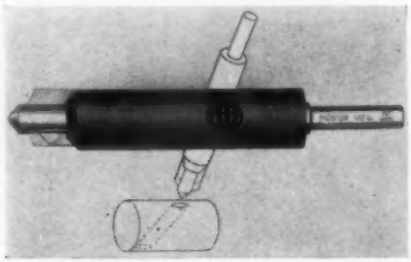
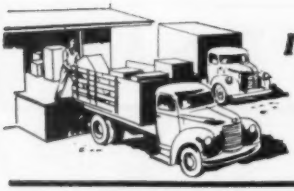


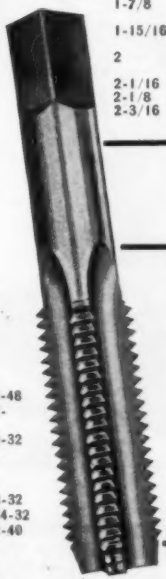


IN STOCK FOR IMMEDIATE SHIPMENT

Special Taps

HIGH SPEED RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40-48
8	24-30-36-38-40-44-48
9	24-28-32-40-48
10	28-30-36-40-48-64
12	20-28-32-36-48
14	20-24-28
1/16	60-64
5/64	36-48-72
3/32	48-56-60
7/64	48-56-60
1/8	32-40
5/32	32-36-40-48
9/64	36-40-48
11/64	36
3/16	20-24-32
13/64	32-36-48
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40-48
5/16	16-20-22-27-28-32-36-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-36-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-27-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24-36
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-35-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

LEFT HAND AND SPECIAL DIES IN STOCK

PRICES ON APPLICATION. NEW SIZES ADDED FREQUENTLY

NOTE: Oversize — Undersize — and ACME Taps available. H. S. Extension drills—Special Reamers and Special Milling Cutters, etc.

WRITE FOR SIZES AND PRICES

WE SPECIALIZE IN HIGH SPEED CUTTING TOOLS

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ALL TOOLS SOLD ON A MONEY BACK GUARANTEE

WESTERN TOOL SUPPLY COMPANY

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Mechanics Through The Ages

In mediaeval PARIS, THE KING'S MARSHAL HAD FULL AUTHORITY TO DISMANTLE THE FORGE OF ANY BLACKSMITH WHO DEFIED HIS ORDERS.
AL REET

WESPO **for ALL**

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TOGGLE CLAMPS

35 TYPES AND SIZES

NOTE These Features: Reamed holes—hardened serrated bushings—high tensile strength rivets.

STANDARD FIXTURE CLAMPS
15 STYLES · 136 SIZES
OVER 1000 COMPONENTS
TYPES AND SIZES

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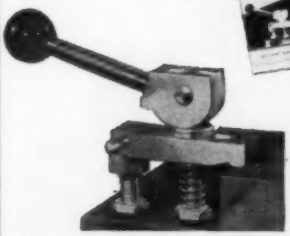

WEST POINT MFG. CO.

26931 West 7 Mile Road **Detroit 19, Mich.**

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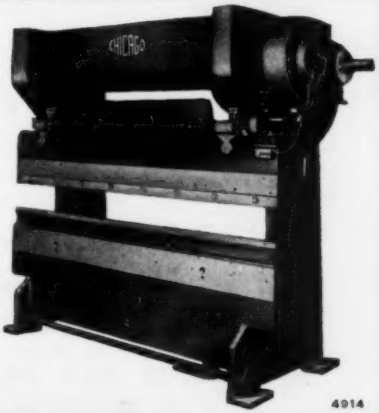
STEEL

CHICAGO

PRESS BRAKES



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DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.

4914

DREIS & KRUMP

MANUFACTURING COMPANY

7440 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO
STEEL BENDING BRAKES
BOX and PAN BRAKES
PRESS BRAKES

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MACHINE AND TOOL **blue book**

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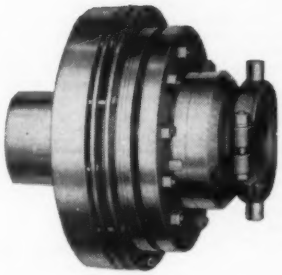
"The Clutch of Robust Refinement"

This is **VALUE**

CONWAY CLUTCH



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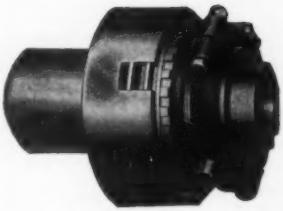
The CONWAY LINE covers the field and leads in the ability of each clutch to activate power the instant required. In conception and engineering these clutches achieve the maximum in fulfilling all requirements.



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From tiny fractional types to 300 h.p. the Conway Clutch stands out in peak performance under conditions far and above normal.

Standardized interchangeable parts built from basic materials

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THE CONWAY CLUTCH CO.

1105 Marshall St.

Cincinnati 25, Ohio

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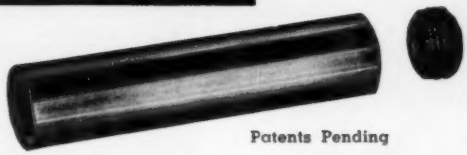

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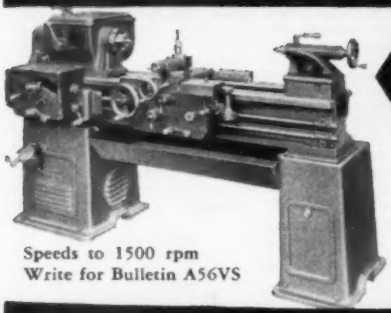

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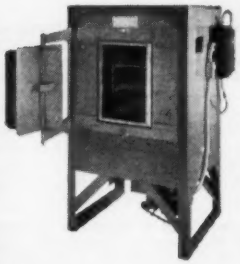

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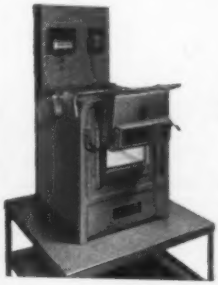

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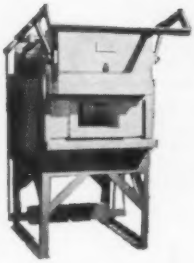

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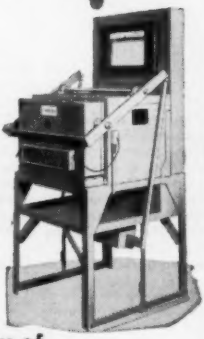

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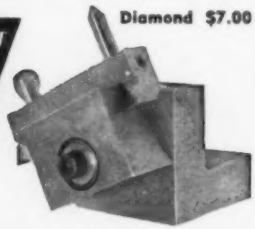

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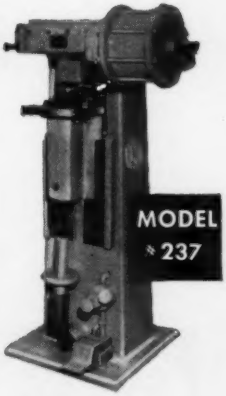

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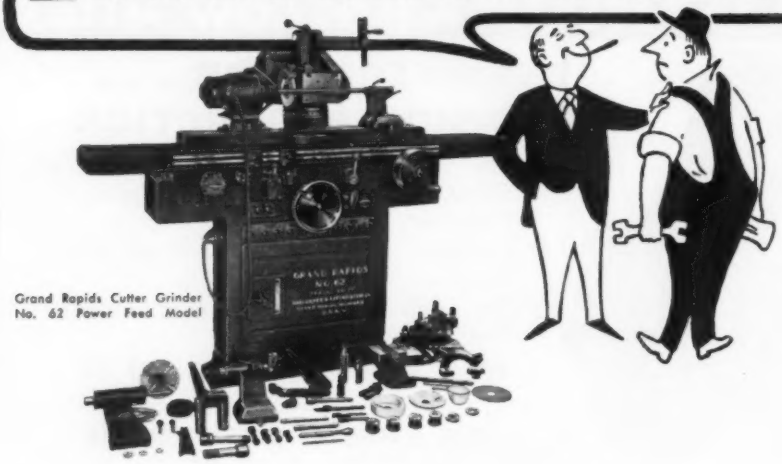

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212	237	262	287	312	337	362	387	412	437	462	487	512	537	562	587
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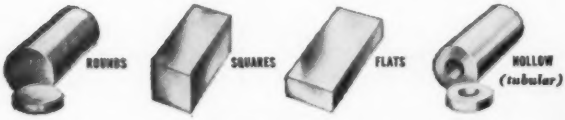

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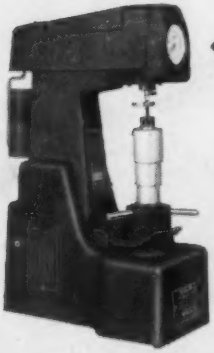

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